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TELEPHONY

THE JOURNAL OF THE TELEPHONE INDUSTRY

FALL RURAL ISSUE

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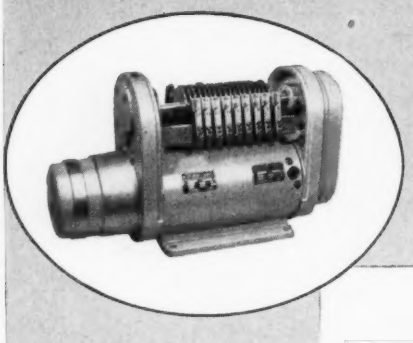
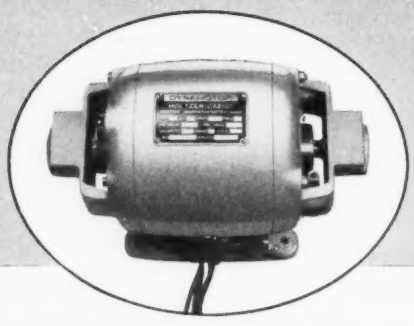
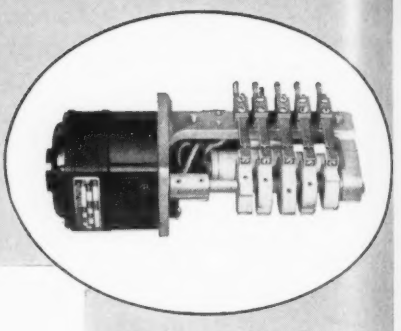

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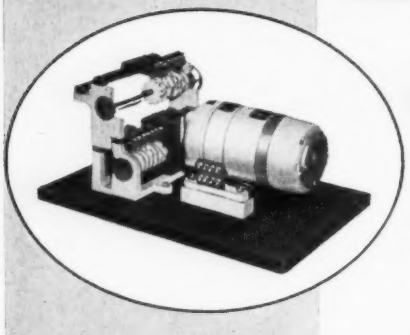
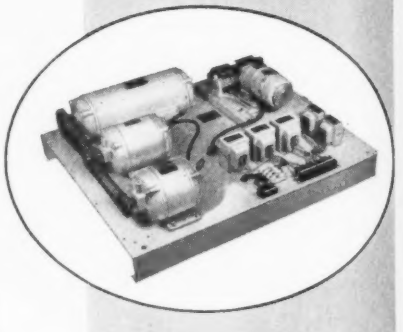

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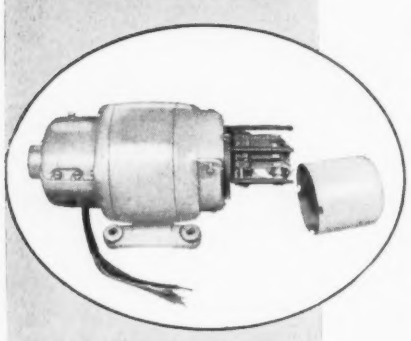
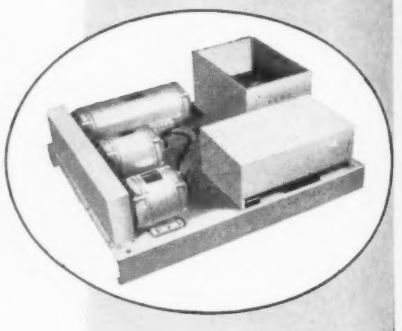

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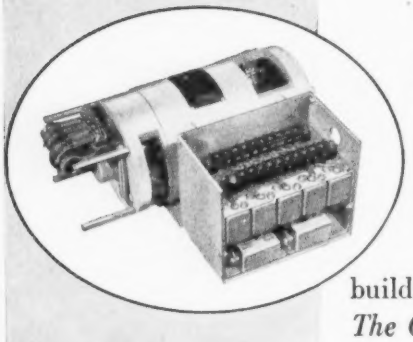
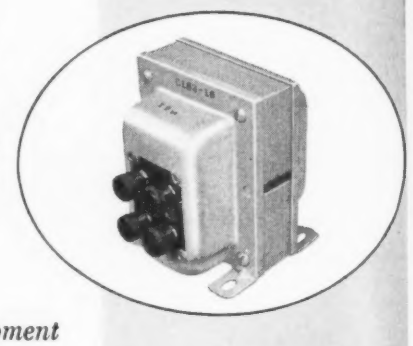

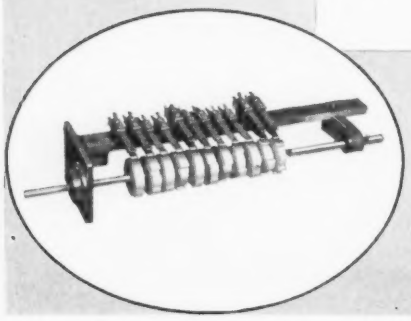

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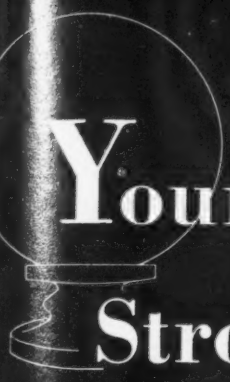

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FLASHES AND PLUGS

SHOW ME THE WAY TO GO HOME. A Wheeling, W. Va., man was arrested recently for frightening telephone operators by trying to force his way late at night into the Ohio Bell building at nearby St. Clairsville, O.

It wasn't that he was anxious to make a telephone call. The arresting officer said the man evidently mistook the lighted building for a tavern.

• • •

HELP! HELP! OPERATOR! Perhaps citizens in San Diego, Cal., are just too lazy to break the glass.

The city manager reported to the city council that the public used the telephone in at least 90 per cent of instances to report fires.

Of the remaining calls, the official said, more persons than those who use the alarm boxes go to fire stations to report fires.

• • •

REST IN A NEST. According to a news report from Praetoria, South Africa, crows like to build their nests in telegraph wires. To prevent the wires from damage, the government put special nesting bowls on the telegraph poles. The crows soon occupied all the bowls and are again building nests in the wires.

• • •

MSG. UNITS. The customer dashed into the business office and demanded with indignation, "Who is this Mrs. Unit who's been using my telephone?"

• • •

RELIABLE SOURCE. The service representative was taking an order for an unlisted telephone. The representative warned the subscriber not to forget his number—suggesting he write it down somewhere, just in case.

"Don't worry," said the man, "if I forget it, I'll just call home. My wife will know."

• • •

SAINT'S ALIVE. A motorist had just crashed into a telephone pole. Wires, pole, everything came down around his ears. As rescuers untangled him from the wreckage, he reached out feebly, fingered the wires and murmured, "Thank Heaven I lived clean. They've given me a harp."

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Telephony

THE JOURNAL OF THE TELEPHONE INDUSTRY

December 8, 1951

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EDITORIAL

Small Companies Take Initiative

THE current interest on the part of a greater number of smaller telephone companies to modernize their operations, both from a service and financial standpoint, is very gratifying to TELEPHONY. For the past several years we have taken the lead in focusing attention on the need for the small companies to do more "under their own power" to improve their positions and for the industry as a whole to render more assistance to those companies.

It was in January, 1944, when TELEPHONY inaugurated its so-called "small company campaign"—almost a year prior to the introduction in Congress of the first Rural Telephone Act, which occurred on Dec. 8, 1944.

At first some did not take kindly to our criticism of the average small company's laxness in getting "its house in order" and our suggestion that trade journals, large operating companies, associations and manufacturers were not doing all they could to assist the smaller units. However, as our campaign progressed, the small company and its problems became the No. 1 consideration (as it is today) of the industry and many state commissions.

Today, a large part of our interest still is in the small companies and we shall continue our efforts in their behalf. But we have always maintained, and still do, that if they are to improve their status they must take the initiative and develop the will to help themselves.

Small companies have always formed an important link in this nation's unexcelled telephone system which has been established and operated under private enterprise. Today, many of them face the challenge of modernizing their operations if they are to continue their important niche in the privately owned nationwide system.

With a determination to meet this challenge, these companies can expect, and will receive, the advice and counsel of the larger companies (both Bell and Independent), associations, trade journals and other units of the industry on such items as (1) improving and expanding their plants and service; (2) securing adequate private financing; (3) developing modern bookkeeping methods; (4) obtaining adequate rate structures.

The scores of small companies which have successfully met the challenge have taken advantage of every medium of assistance open to them. Two of the most important sources of help which those companies have used are TELEPHONY and the state telephone associations.

TELEPHONY, in its 52 issues per year, is able to cover many subjects of vital interest to small companies, pertaining to every phase of the telephone business. State association secretaries and their small company committees are in a position to give the smaller units concrete help and advice.

During the past several years a major part of TELEPHONY's impressive circulation increase has come from those smaller companies which have been sincerely interested in improving their situations. Also, the increased membership in the state associations and the growing attendance at their conventions have been largely due to the participation of those same companies. They have found that the benefits derived from subscriptions to this publication and membership in state associations by far outweigh the small costs involved.

Those companies which have not made much effort to help themselves can well afford to take a leaf from the books of those who have taken such action. One thing is certain: Unless they make such effort, they are not in a position to expect much sympathy or assistance from others in the industry.

IN THE NATION'S CAPITAL

BY FRANCIS X. WELCH
WASHINGTON EDITOR

New FCC-NARUC toll separations plan now called the Charleston Plan. . . . Test run of plan to be made in Missouri rate case of Southwestern Bell Telephone Co. FCC rules no censor of political radio talks. Copper outlook for industry appears tighter.

WORD comes from Jefferson City, Mo., that a test run of the new separations procedure, recently agreed upon by the Federal Communications Commission and the staff experts of the state commissions and the Bell System representatives will be made in the pending Southwestern Bell Telephone Co. rate case before the commission. The new plan has come to be known as the "Charleston Plan" by reason of its sudden announcement by FCC Commissioner Walker at the Charleston convention of the National Association of Railroad & Utilities Commissioners (NARUC) in October.

The Missouri commission's chief accountant, Homer L. Thorp, is urging the shift from intrastate to interstate accounts of Southwestern Bell Telephone Co., involving a substantial amount of investment and operating expense. Operation of the Charleston Plan would thereby reduce Southwestern Bell Telephone Co.'s stated revenue requirements, within Missouri, by about a million dollars, according to testimony before the Missouri commission.

There seems little doubt that the Missouri commission will accept the Charleston Plan in some form or another. It has been tentatively agreed to by the company and the cities appearing in opposition to the rate increase, as well as the commission's own technical staff. According to the commission staff's testimony, the company's petition of a rate increase amounting to $16,656,000 for its intrastate operations within Missouri would be reduced by approximately $1,000,000.

The company's witness, C. R. DeWitt, chief supervising accountant, told the commission about the Charleston Plan, how it had come about, and he presented specific figures which had been checked and accepted by the commission's chief accountant, Mr. Thorp.

"The question of separation of intrastate and interstate operations is not a static thing," DeWitt testified, "but must go along with changes in the business." He added that the Charleston Plan appears reasonable and that there appears to be general agreement on applying it, so that the effect would be uniform nationally. DeWitt showed that application of the Charleston Plan to the company's claims in the rate case would have the effect of increasing the rate of return, or profit earning, by only about .2 of 1 per cent.

Thorp, in a statement to the commission, said Southwestern had applied the complicated terms of the Charleston separations system as correctly as it was possible to do so.

Commissioner E. L. McClintock inquired as to Thorp's position on the "Phoenix Plan," an earlier and much more drastic proposal for shifting more financial burden from intrastate to interstate telephone operations. (Phoenix, Ariz., was the site of the 1950 convention of the NARUC.) Thorp's earlier testimony in this case had been based on use of the Phoenix Plan, which, however, failed to gain general approval among the nation's regulatory agencies.

Thorp said both plans now were before the Missouri commission, which could choose between them. He expressed willingness to stand on the Charleston Plan, however, and offered, if desired by the commission, to withdraw the recommendation for the Phoenix Plan. Commissioner K. D. Williams, presiding, said, with reference to the Phoenix Plan, "It's in the record for what it's worth." The commission had reopened the case on its own motion to take testimony on the Charleston plan.

FCC Rules No "Censor"

The FCC is getting it on the record early—before the heavy shooting starts in the 1952 presidential campaign—that it is not going to be caught in the middle, on charges and countercharges about censoring political talks via radio or television. This took the form of an announcement recently that the FCC will strictly enforce a law forbidding radio stations to censor speeches by political candidates.

The commission pointed out that the Federal Communications Act prohibits radio censorship, even if the speech is libelous. The explanation which the FCC has, for taking such a broad liberty in broadcasting, is that radio stations cannot be held responsible for damages (or otherwise) for things which a candidate might take it into his head to say in the heat of a political campaign. (There are some lawyers who doubt this. The point has never been fully tested as far as the U. S. Supreme Court, although several decisions on the subject lean in the direction indicated by the commission.)

The commission repeated its rule about censorship in forgiving New Orleans radio station WDSU for refusing time to Alvin A. Cobb, a 1950 candidate for mayor of New Orleans. The station operators told the FCC that it turned Cobb down because his script contained libelous and defamatory statements which the candidate refused to alter. Station officials said they took their stand after consulting their lawyers.

The FCC agreed to renew the station's license because the station apparently "acted in good faith and . . . it cannot be said that the conduct was in deliberate or wilful violation" of the Communications Act.

"We will, however, in the future consider that there is no open question with respect to censorship on the part of the licensee of material broadcast," the FCC warned, "and licensee will be expected to abide strictly by the provisions (dealing with political broadcasts)."

The commission had held in its earlier decision that there could be no excep-

tion to the law on censoring candidates.

No Rosy Outlook for Copper

The NPA Communications Equipment Division is an agency which has to look ahead in planning the scarce material requirements of the telephone industry. It was only last month that the industry received its first really rude jolt of the present emergency with the announcement of a cut-back in copper and steel allotments for the first quarter of 1952. Now, the NPA Communications Equipment Division is already busy as a bunch of bees in August trying to tie up the loose ends of its presentation of the industry's material needs for the second quarter of 1952 to the Defense Production Administration (DPA).

And it can be said already that the outlook is even more disturbing. It looks, at this writing, as if the second quarter allotments will be even stingier than the first quarter. The pressure will be felt mainly in the available supply of copper so important to telephone companies. Steel will not be any easier, either, except as to certain special shapes. And the aluminum outlook, while showing some improvement is not of any comparable consequence to the telephone industry as the copper supply.

Military needs, of course, are steadily moving in, ahead of the industry, and grabbing off all the loose copper during this period. But it is the Atomic Energy Commission (AEC) which will prove to be the real copper glutton. Nobody, on the outside, knows exactly what the AEC is doing with the copper—nor how long it is going to require such tremendous amounts. The best assurance the NPA can give is that, living from quarter to quarter, the third 1952 may be a little better than the second and that the fourth may be the best of a scarce year, but none too good at that.

Already, the NPA Communications Equipment Division is assembling information on second quarter needs. DPA has laid down what it calls an absolute deadline, Jan. 15, before which all facts and figures are supposed to be completed and in the hands of DPA. But at the rate forms are coming in, the NPA Communications Equipment Division officials are wondering if this is going to be physically possible.

Meantime, the NPA division has been able to take care of a number of appeals for specific amounts of copper for particular telephone companies on the so-called "hardship case" basis. There is no assurance that all future appeals in this category will be handled as well. The probability is that some will have to go short before the new year is over. So far, the NPA division has been able to avoid that.

Utilities Need "An Even Break"

An editorial appearing in the Nov. 13, 1951, issue of the Chicago *Daily News* titled "Not Strangulation," concerning the regulation of public utilities, should be of interest to those in the telephone business and in all other public service industries, as well as to those active in the regulation of utilities. The editorial in part follows:

"The Pennsylvania Railroad deserves applause for having the courage to speak its mind on the subject of rate regulation by the Interstate Commerce Commission. Ordinarily, a utility no more talks up on this subject than Junior tells teacher his opinion of her; it's too likely to show in his grades.

"The railroad's operations vice president, J. M. Symes, assailed the ICC on two grounds. He charged that long delays in granting rate relief —averaging almost a year—penalized the road unfairly, and that, in its zeal to "protect the public," the ICC habitually refuses a carrier an even break.

"Chicagoans can assess the value of this complaint more readily by recalling the history of the local transit lines under state regulation. Under the publicly managed, tax-free Chicago Transit Authority (CTA), fares have doubled, evidence enough of why, under a regulatory body with its eye on the voters, the former private system was becoming junk. (See editorial, TELEPHONY, Sept. 29, 1951, p. 13.)

"Last August the Chicago Motor Coach Co. entreated the Illinois Commerce Commission to make an emergency case of its request for a 15-cent fare, since it had been obliged to grant the same wage increases that CTA gave its unions.

"CTA can order a fare increase on little or no notice, allowing for a few days of hearings for the customers to blow off steam. Motor Coach, being a private—and heavily taxed—enterprise, was forced to wait three months while its case was investigated by the Illinois commission. Vexing as this was to Motor Coach, it is far better than with the federal cases . . .

"Regulation of utilities is still required, in the interest of fair and orderly competition, and to insure that all groups of consumers get the same consideration. But the delays and inequities to which private businesses are subjected, as contrasted with the publicly owned ones, deserved the timely spotlight focused on them by the Pennsylvania."

Retroactive Rate-Fixing

What is happening to recent rate cases in the telephone and other utility fields indicates that the *lag* between asking for higher rates and actually getting them, is becoming just as big a problem as the need for higher rates.

The situation is made all the more difficult by the fact that the politicians have found a way to make *tax increases* retroactive, and proceeded to do so, in enacting the higher corporate income tax law now in effect.

Furthermore, some of the labor unions have found a way to make *wage increases* retroactive and have proceeded to do so—especially in the transit wage field. But, so far, nobody has yet discovered a way to make *rate increases* retroactive. The utility company which is caught with these higher expense burdens must simply hang on and hope that the regulatory agencies will come to their rescue as soon as possible with rate increases.

But, there is no hope for recovering the extra amounts (in taxes, wages, or other expenses) which have to be laid out on operations during the period, in which the commission must consider the evidence and make up its mind whether any rate relief at all is warranted. True, some states have automatic limits on rate change suspensions, after which proposed higher rates go into effect unless altered by positive action or order of the commission, based on hearing and evidence. Even such protection can become mighty thin during a period of galloping inflation when as little as a six months' suspension in rate relief can change the picture entirely.

The recent action of the Michigan commission in denying the rate increase sought by the Michigan Bell Telephone Co. is certainly a case in point. Here the commission admitted the strong possibility that the company would suffer retroactive tax increases, but at the same time it made no provision for it. The ironical fact is that by the time the commission's order was issued, the increased tax liability had already become a definite obligation.

It is all very well to say that the way is now open for the telephone company to go back to the commission for more rate revenue. The commission's order carefully left that door open.

But the company is now faced with

(Please turn to page 62)

PLANNED CONSTRUCTION *in the* SMALL EXCHANGE

By RAY BLAIN

GOOD tools such as trenchers, cable plows, earth boring machines and well equipped line construction trucks can be used to advantage on all telephone plant construction projects. These tools prove a good investment for many of the larger companies that have a frequent need for their use; however, they are seldom within financial reach of the average small operating company. Tools of this type may be rented at a reasonable rate in some localities, but, as a rule, the best and most economical plan is for a small company to handle all of its construction projects by contract.

When the average small company attempts to handle its own construction jobs, it is not only necessary for the company to obtain special tools, but, in addition, to expand its regular forces for comparatively short periods of time. If proper tools are not made available, labor costs are certain to prove excessive. On the other hand, recognized contractors have qualified men available on their payroll to meet every construction need.

By utilizing a contractor's services, an operating company may maintain its reputation for continuous employment and still overcome peak construction requirements. When a contractor handles all construction jobs, the operating company does not have to worry about paying for vacations, pensions, sick leave, etc. Nor is there any extra cost in obtaining and training of such qualified workers. Higher quality is generally built into a plant by a contractor than is possible when a small company attempts its own construction work.

There have been cases where small companies, and even some of the medium sized ones, have attempted to handle their own cable splicing jobs with disastrous results. Cable splicing knowledge is not something that can be acquired quickly by the average worker. Nor is the best work accomplished by the occasional splicer, who may spend the remainder of his time shooting trouble or installing telephones. For the best results, a splicer must keep his hand in and work at splicing continuously. It always proves more economical to splice new cable properly, even at a much higher cost, than to splice it in an inefficient manner and then worry with costly maintenance and service interruptions over a long term of years.

When the construction of new plant is contemplated, careful advance planning is always necessary. In this connection, the services of a consultant may permit a considerable savings. This is especially true of smaller companies that may not have proper engineering talent available. Good engineering involves the selection of the type of plant best suited to the needs of the particular locality and the one that will provide the most economical service over a long period of time. In the engineering of new plant, forecast studies of growth should be carefully considered in order that adequate capacity may be provided to serve an exchange area over a specified period of time.

In planning the construction of new facilities, local conditions involved should be carefully evaluated in order to determine what type best meets the specific requirements. It may be determined that the required new facilities will be cable or open wire. If it is determined that cable proves in, further study should be made to determine whether it should be aerial or underground. In the event it has been decided to use aerial cable, will it be the conventional lead-covered type or plastic-insulated and jacketed? Further, will spans of the usual length or extra-long be used? If underground cable is to be used, must it be placed in conduit or will the buried type suffice? If open wire lines will meet the service requirements, can long span construction be used to advantage?

In general, it is considered desirable to have all lines leave the exchange in underground cable. The exchange being centrally located, in most cases, it must be on paved streets or on streets likely to be paved at a later date. In locations of this type, cable should be placed in conduit to provide the required flexibility. An adequate number of ducts should be provided in each conduit run to adequately handle all future growth. Suitable manholes should be provided along this conduit run to adequately handle distribution and splicing. When this type of plant is provided, defective cables can be replaced or new cables added without disturbing the surface of the paved streets or interfering with traffic. While it is true that the initial cost of conduit and manholes is rather high, this expense can usually be justified in all areas adjacent to the exchange where paved streets and heavy distribution may be involved.

Buried cable can sometimes be justified for use beyond the conduit, in sparsely settled residential and rural areas where growth is small. However, because of corrosion trouble on lead sheathed cables, when buried directly in the ground in many localities, this type of construction, in recent years, is

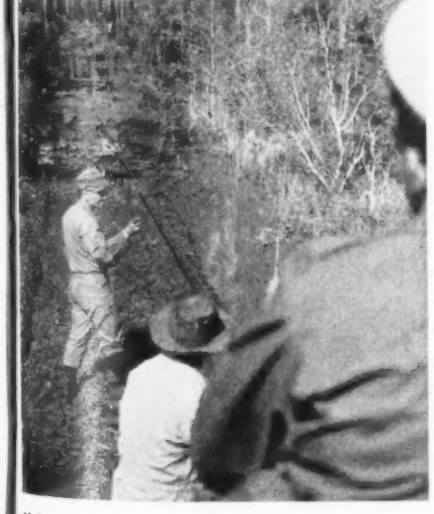
An over-all view of mud, men and machines in a battle to lay a cable through a swamp.

This bulldozer with its tremendous power will prove extremely useful on any large cable laying job.

decreasing in popularity at a rapid rate. If tape armoured or jute and compound protected cables are buried, the cost of this type of construction is increased greatly. As a rule, the use of buried cable will be limited to cases where a single cable will care for all requirements for a substantial period of time.

Difficulties are invariably encountered when it is necessary to place a second cable along a buried cable route in the event it becomes necessary to provide additional facilities at a later date. Cable terminals are usually installed on poles along a buried cable route when aerial drop wire distribution is to be used. Pedestal-mounted terminals prove desirable when underground distribution is required.

Aerial cable may prove desirable to extend lines beyond the conduit or the buried cable construction. Because of the tremendous increase in telephone service requirements over the past few years, it is now common practice for cables to extend several miles into rural areas from many exchanges. In many areas, cable proves more economical to construct and maintain than heavy leads of open wire.



Using the winch of a tractor to pull the cable train over a tough spot.

After a decision has been reached that cable will be used for a specific job, then the size and gauge necessary to meet service and transmission requirements must be selected. Plastic-insulated and jacketed cable often proves ideal for use on long span aerial construction in rural areas. Long span cable construction proves especially desirable in rural areas where distribution is not a controlling factor. Long cable spans also lend themselves well to joint construction with electric lines where spans are usually much longer than would be normally used for telephone plant.

The specific advantages of using long span construction are essentially as follows:

(1) Fewer poles are required, and, in many cases, it will prove more economical to provide the required pole strength by the use of a lesser number of larger poles than a greater number of smaller poles.

(2) Through rough country, the use of long spans permits greater latitude in the choice of pole locations. This action makes it possible to take advantage of irregularities in the terrain and avoid the use of long poles for grading the line.

(3) A reduced number of poles naturally permits a corresponding reduction in the number of holes to be dug. The labor saving in this connection may be substantial, especially when rock or extra-hard digging may be involved.

Damage caused to cable plow when an underground obstruction is encountered.

(4) Resistance of poles to leaning is increased rapidly with increased depth of setting. Pole stability varies more nearly with the square of the depth of setting than proportionately with it. When poor soil conditions are encountered and special attention to setting is required, it may prove economical to reduce the number of poles by increasing the span length and to concentrate on improving the setting of fewer poles by increasing the depth of setting.

Long span construction proves especially desirable for aerial lines when high tensile strength wire is used. Extra-long span construction, with spans up to 600 feet, have now been made possible by the use of HTL-190, the new extra-high tensile strength galvanized wire recently made available.

(Please turn to page 44)

Original Entry: The Most Important Trouble Record of All

By L. N. MARTIN

WHICH of the trouble records is the most important? If a company keeps only one record, what should that record be? Ask an accountant what he considers the most important record that he keeps and he will tell you it is, "The Original Entry" record. By that he means the first record of any transaction.

In the old days it was the "Day Book," a blank book in which the transactions were recorded as they occurred. Today the Original Entry record may take one of many forms. Some may even be mechanical, such as the tape from a cash register, or, in our own business, the perforated tape from the automatic toll billing registers.

If all books but the Original Entry are destroyed, the most complicated system of books can be reconstructed from the original entry. The Original Entry is the only record that is admissible as evidence in a court of law.

We have carried this parallel to some length because it is applicable in making trouble reports. The fundamental trouble record, and the one which we believe to be the most important, is the first record that a telephone company makes of a trouble report. This is often called a "Trouble Log" and it corresponds to the Day Book of the bookkeeper. If the log is preserved, the most complicated trouble records may be reconstructed. The Original Entry of trouble is the only record that may be used as evidence in a court of law or before the regulating commission.

It is not at all unusual for a case of trouble to become a court case when it has caused property damage, personal injury or even a dispute over a bill. The trouble record of a telephone company is often examined by a commission. True, a telephone company may sometimes be condemned by its own record, but it is certain to be condemned if it has *no* record. Imagine the position of a company if in a case of trouble involving a lawsuit, the company has to admit in court it keeps no record of trouble. This company will be at the mercy of the other party to the suit.

PART 7. The preceding article in this series appeared in the Dec. 1, 1951, issue.

The author of these articles would like to tell in the first person the story of his first contact with a trouble record:

"The first day that I worked for the telephone company in my home town, and which was destined to be the first day of a long telephone career, I saw attached to the end of the two-position magneto board a little blue notebook such as sold for five cents at that time. On it someone had marked with big block letters "Trouble Book" and it was attached with a stout cord to a screw-eye in the board so that it could not be misplaced.

"Its use was soon explained to me. When a subscriber reported, or an operator observed, a case of trouble it was to be written in the Trouble Book. The lineman would check the book when he went to work in the morning and again after lunch, and would make his own notations of the telephones which were out of order. When he cleared a case of trouble, he would usually test with the operator and then tell her to place a check mark at that item in the Trouble Book, or he might wait until he came in to the office and check off the cleared trouble himself.

"I did not know it then, but I know now that this company was very progressive for its time (1903) for now in the year 1951 I find many companies of comparable size that have no trouble record whatever."

The record described above was not complete as it did not show *what* was found or *when* the trouble was cleared. If this information had replaced the check mark after each report, it would have been a complete Trouble Log and a record that could have been expanded into any analysis or study desired.

The blank book form of Trouble Log is still a good one for a small company, although one disadvantage is that it requires much writing. When a printed form is used, a check mark here and there, a word crossed out and a few letters or figures in the proper blanks take the place of many written words.

Let us see what a complete record of a case of trouble should include:

Date and time reported.
Telephone number.
What was reported.
Class of report (TELEPHONY, Sept. 15, p. 18).
Voltmeter test (Time Tested may also be desired).
Case assigned to_____(and time).
Time cleared (and date if carried over).
What was found and how cleared.
Primary cause of the trouble (optional).
Class of trouble (TELEPHONY, Dec. 1, p. 16).
Was it cleared within the time objective? (TELEPHONY, July 7, p. 20).
Number of days carried, if any.

These details may seem to require much writing, but a very small company should have few cases of trouble and hence may find time to write all of these details in the log.

One of the many reasons for keeping trouble records is to make certain that a trouble report will not be overlooked or forgotten. When a subscriber reports a case of trouble and waits patiently and trustingly for the company to clear it, only to find after several days that the company has overlooked or misplaced the report, that company's public relations suffers a setback. Regardless of what system of trouble records a company may adopt, this purpose of good public relations must be kept in mind.

If the blank book Trouble Log is used, it is possible (in fact it may be fairly easy) to overlook a report, especially when a page has been turned. To guard against this the book should be checked at regular intervals by some reliable person.

A good plan is as follows: Each morning check the record for the day before. Copy any carried-over reports to the new page (or under the new date line) *using red pencil.* Place a red check mark after the original report to show that it has been so forwarded. This places all carried-over trouble on the current page of the log and in red pencil to indicate that it should receive first attention.

Yes, the blank book Trouble Log still has its place and, to a small company which now has no trouble record whatever, we would say: "Invest 15 cents in a notebook *today* and start a Trouble Record."

Another form of Trouble Log that is popular with small companies is the Trouble Ticket. A separate ticket is prepared for each trouble report. Some

companies give this ticket to the repairman who carries it with him, writes in the clearing data when he clears the case and returns the completed ticket at the end of the day. As these tickets are printed, they should include enough printed matter to reduce the written portion to a minimum. Blank spaces should be provided for date, time, and telephone number.

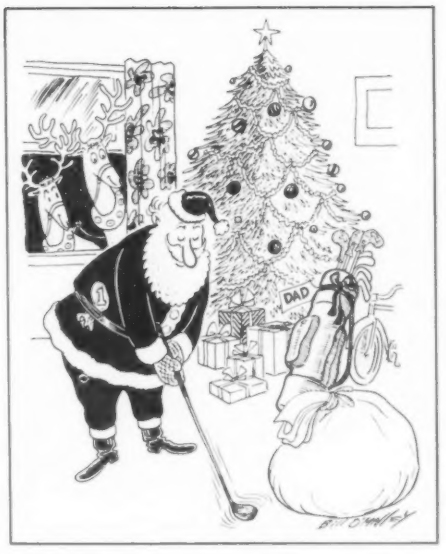
A number of the more common reports such as BDR (bell doesn't ring), CH (can't hear), CGC (can't get central) may be printed on the ticket so that a check mark or an underline will indicate the nature of the report. However, at least two blank lines should be left for writing out a less common report in full. The class of report (TELEPHONY, Sept. 15, p. 18) may be indicated by "I S C" (one to be checked). "Cleared" or "Not Cleared within objective" will indicate this item by drawing a line through the words that do not apply. There will probably be room on the ticket for the complete list of Trouble Classifications in abbreviated form. (See TELEPHONY, Dec. 1, p. 17).

Several firms which advertise in TELEPHONY specialize in printing for telephone companies. These firms should have stock forms for trouble records and we suggest that you send for samples. However, if the stock forms do not *exactly* meet your needs, we recommend that you pay a little more and get exactly what you want printed to order.

One advantage of the Trouble Ticket is the ease with which any kind of classification or analysis can be made from them. It is just a matter of sorting tickets. File the tickets until the end of the month; then sort them according to class of report and count the tickets in each pile. Re-sort them as to cleared or not cleared within objective. Other special information may be obtained in the same way the tickets are sorted by "Class of Trouble." Now, if one or more classes of trouble are to be given a further analysis, those piles can be sorted according to "primary cause of trouble" or on some other basis that will point the way to the remedy for the excessive trouble.

One objection to the Trouble Ticket is the ease with which tickets may be lost or misplaced. As these tickets are "Original Entry," it is important that none be lost. Also, lost tickets result in neglected trouble and in an incomplete final summary. If repairmen take the tickets with them when clearing trouble, some tickets are almost certain to be lost.

One method of guarding against this is the serially numbered ticket plus



a daily check to see that all tickets are accounted for. Another method is to make carbon copies of the tickets. This assures a copy of the report (but not of the trouble found) if a ticket is lost. A third method would be to register the tickets in a book as they are issued (just ticket number and telephone number) and check them off as they are returned.

One company uses a combination of the first two methods. Tickets are bound in books of 50 originals and 50 duplicates, the originals perforated for tearing out and the duplicates firmly attached in the book. The tickets in each book are also numbered from 1 to 50. (It is not necessary to number above 50 since, by the time these are used, the date will clearly show that a new series of numbers has started). Even with these precautions, frequent checks should be made to be sure that all tickets are accounted for.

The third form of Trouble Log, and the one usually used by large companies, including the Bell companies, is in the form of printed sheets, 8½x11 inches in size. They are punched for binding and for mounting on a writing board. The sheets are ruled horizontally and in vertical columns. At the top of the sheet is a blank for the date and each column has a printed heading.

A line is used for each trouble report. Columns of suitable width are provided for: Time, Telephone Number, Nature of Report, Time Cleared, Class of Trouble, etc., and a column as wide as possible is provided for remarks or miscellaneous information. The Class of Report may be indicated by three very narrow columns headed I, S and C. A check mark or a stroke is placed in the proper column and these columns are added at the bottom of the sheet. Other miscellaneous data is arranged in columns so that the columns can be added but the "Class of Trouble" must be "raked" from each line on to a tally sheet.

One or more sheets as required are used for each day's trouble. An exchange which ordinarily uses less than a half sheet in one day may place a second date heading in the middle of the sheet. When the regular repair clerk leaves for the day, she passes the log (still attached to the writing board) to whoever is to care for the log during the evening hours.

Some companies have had trouble with properly maintaining the log at night when it may be handled by various traffic employes, some of whom may not have received sufficient training in this job. It may be necessary to have the traffic department report trouble at night on another form or on tickets. This should be avoided if possible, but if it is unavoidable, remember that such reports by traffic are "Original Entry" and, when copied on to the regular log, these original forms or tickets should be firmly attached to the log sheet to which they have been posted.

This form of Trouble Log is always used in connection with a "Subscribers' Line Card File" (which will be discussed in another article) and some of the data is placed on the line card rather than on the Log.

In a recent article we stated that, since some small companies will not want to adopt all of the trouble records which we are recommending, we would later discuss a "Minimum Plan" for small companies. We have now kept this promise. The Minimum Plan is *a Trouble Log* (in one of the forms discussed in the foregoing) *and no other record.* And we firmly believe that *no company is too small to have a Trouble Log.* Even in the case of a mutual farmer line with a dozen or so telephones, we believe that the president or secretary or some other designated member of the mutual should have a little notebook in which he records each case of trouble as it occurs.

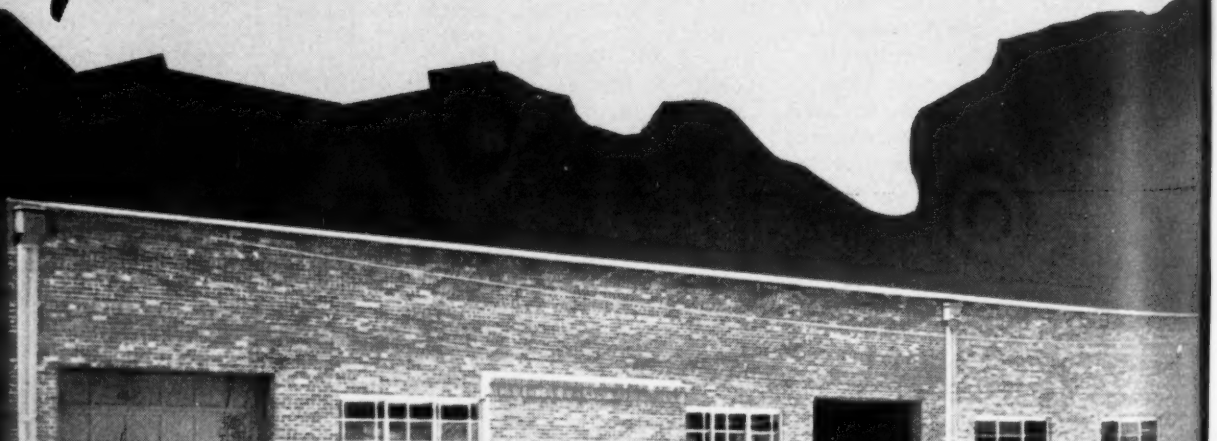
This minimum plan, consisting of the Trouble Log only, provides a legal record of trouble and assures that no report will be forgotten. True, it does not provide any analysis or trouble data and it does not automatically warn of excessive or increasing trouble as would a more elaborate plan, but any fact desired may be "dug out" of the log by a little work. We will give a concrete example:

A certain small company has kept a Trouble Log in blank book form for

(Please turn to page 46)

CHICAGO 38, ILLINOIS

Let Our Warehouses Worry About Your Supply Problems



DALLAS 2, TEXAS

When it comes to line supplies, *come to Kellogg!* . . . Shipments will be made from distribution centers nearest to your exchange. Kellogg maintains large stocks of most construction items at strategic locations from coast to coast.

Kellogg's branch warehouses in Chicago, Kansas City, Dallas and San Francisco, plus more than 100 other source warehouses, are ready to save you money and serve you better!

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Modern Cable Testing Techniques

By DANIEL SEITZ*
Member
USITA Plant Committee

PART I

[EDITOR'S NOTE: *This is an address presented by Mr. Seitz before the Plant Conference at the recent convention of the United States Independent Telephone Association.*]

* * *

MODERN cable testing techniques are worthless unless implemented with modern testing equipment. Good testing instruments, like other good tools, are essential in every phase of telephone work, engineering, design, construction, maintenance, etc.

The most expensive or complicated testing equipment is not always the most desirable for making a particular test, but rather one that is fitted for the job. When purchasing any testing equipment, the first consideration should be, will it do the job accurately and efficiently and secondly, is it rugged enough to withstand handling in the field, and last, is the cost within our budget. Because the type and size of the cable plant determines, to a great extent, the amount and kind of instruments that should be provided for the efficient operation of any cable system, we will make suggestions applicable to various size cable plants, beginning with the very small installation and including such items as:

(1) The *Multimeter* for testing cable.
(2) The *Tone and Exploring Coil* for locating certain cable faults.
(3) The simple *Battery and Receiver* test for high resistance trouble.
(4) *Pair identification* testing.
(5) *Underground structure location* testing.
(6) *Pressure testing* with nitrogen or compressed air.
(7) The *Wheatstone bridge* for resistance and fault location testing.
(8) *Fault analysis* test methods.
(9) The *Bridge Megger* for cable testing.
(10) The *Capacity Unbalance Bridge* for testing quads.
(11) *Meters for electrolysis* testing.
(12) *Electronic insulation* testing of cable pairs.

The Very Small Cable Plant

We might consider an exchange having a mile or less of cable, consisting of any number of pairs, as a very small cable plant. However, it should be given the same careful preventive maintenance as the system comprising many miles of cable, because it is just as imperative to detect and clear a fault before it happens in the small plant as it is in the large one, especially, moisture faults.

Instruments Required

A multimeter *(Fig. 1)* costing $25 or less, will be found most useful for making numerous tests about the plant. One such meter *(Fig. 2)* is available, having a 3-inch by 3¾-inch scale. This large scale meter is not only desirable because it is easy to read, but it is graduated so that it may be read to .1 ohm.

From zero to five ohms, each ohm is divided by five graduations, or .2 ohm per scale division. However, the space between the scale markings allows one to estimate the resistance being measured to within .1 ohm in this low range.

Between five ohms and 10 ohms, the scale is divided into .5 ohm per division; above 10 ohms, values per division increase, as is the case in nearly all ohm meters.

The multiplier in the instrument allows the range to be extended to several meg ohms.

We recommend this type meter for analyzing nearly every kind of cable fault, especially in the small plant, because it is inexpensive and serves many purposes. This type meter, while not as accurate as a good Wheatstone bridge, will give indications relatively accurate and thoroughly dependable for the following tests.

FIG.-1 Multimeter useful for making numerous tests about the plant, especially suited for preventive maintenance testing of the very small cable plant.

*Mr. Seitz is general plant superintendent of York (Pa.) Telephone & Telegraph Co.

By setting the dial to read ohms, and connecting one test lead to ground while touching the spare cable pair terminals in the central office, any deflection of the meter will indicate a grounded wire or wires. A meter deflection, when connecting the two test leads to the terminals of a pair, indicates that the pair is short. Crosses may be tested in the same manner.

Ohmmeter Tests

All spare pairs in the cable should be tested for solid shorts, crosses, and grounds, and such information recorded on the cable pair record. During, or immediately following rainy weather, tests for shorts, crosses, or grounds will indicate any moisture fault in the making.

It is always wise, and usually more economical, to heed such indications, and make every effort to clear the moisture fault before it has reached the stage where it interferes with the service.

A visual inspection may be sufficient to detect the broken or ruptured sheath where the moisture reached the cable pairs.

Certain older types of face plates in cable terminals are the cause of slight moisture faults, as shorts, crosses, or grounds. Therefore, any suspected terminals should be inspected and cleared before assuming that the moisture fault exists within the cable.

Checking Normal Cable Pair Resistance

It is often desirable to know the wire resistance of the cable pair from the central office to the distant end of the cable for various reasons.

Placing a solid short on a pair at the distant end of the cable, then measuring the resistance from the central office and recording same on the cable record, will be useful information when solid troubles develop, in which case, the resistance to the fault from the central office may be compared with the total resistance of a cable pair.

FIG.-2 Unimeter a rugged instrument recommended for any size plant.

Determining Approximate Location Of Solid Faults

For example, we have one mile of 22-gauge cable, and the resistance of a good pair is 170 ohms. A solid short, caused by lightning, measures 165 ohms from the central office, which indicates

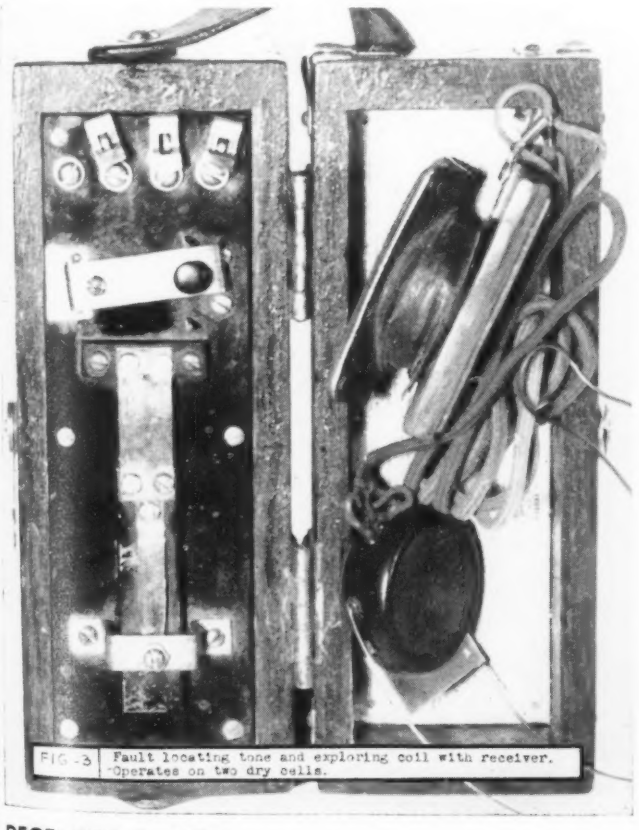


FIG.-3 Fault locating tone and exploring coil with receiver. Operates on two dry cells.

FIG.-4 Exploring coil mounted on jointed rod, eliminating much pole climbing when locating faults in aerial cable.

that the short is near the distant end, or the equivalent of the difference between 170 and 165 or five ohms, therefore, 5 x 31 feet per ohm of 22-gauge cable, or approximately 155 feet from the distant end of the cable to the short.

The approximate location of a cross or ground may be determined in the same manner.

Determining Exact Location of Solid Faults

To clear cable faults, the exact location must first be determined in some manner. Solid shorts, crosses, and grounds, may readily be located by the tone and exploring coil method, and any of the tones available are satisfactory for this purpose.

Locating Moisture Faults

There is considerable difference in the action among the different types of tones and exploring coils when used for moisture faults, especially, trouble of the higher resistance values. Therefore, when selecting such equipment, we should be sure that it is well adapted for locating moisture faults in cables. Assuming that in our small plant, we have the multimeter or ohmmeter; also, a good tone and exploring coil outfit, and during our preventive maintenance tests with the ohmmeter, we find a number of spare pairs in the cable to show moisture faults. By checking all the spare pairs in the cable, we find that only a certain count is effected, which will immediately narrow the trouble down to that portion of the cable in which only the affected pairs appear.

If this happens to be the count of a stub cable, it should be relatively easy to locate the trouble by visual inspection. On the other hand, if spare pairs throughout the entire cable are affected, the fault may be anywhere along the entire length of the main cable.

Selecting Pairs for Tone and Exploring Coil Test

By testing each of the affected pairs with the ohmmeter for shorts, crosses, and grounds, then making up two groups from among those pairs, showing the lowest resistance fault, it may be determined, whether or not, the tone and exploring coil method should prove successful for locating the trouble.

The resistance between the two groups selected must be low enough to stop the tone at the trouble spot, or at most, be low enough so that the short circuiting effect on the tone by the moisture will reduce the tone sufficiently at the fault to be able to distinguish a drop in volume of tone heard beyond the wet trouble.

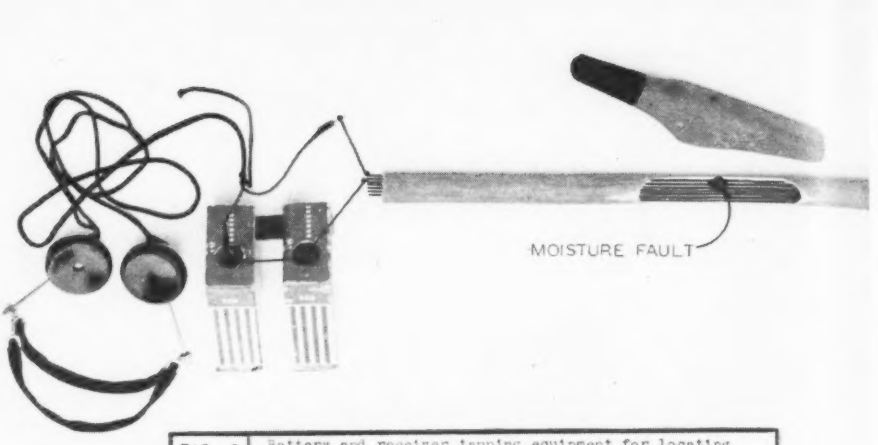


FIG.-5 Battery and receiver tapping equipment for locating high resistance moisture faults.

The tone and exploring coil method is recommended generally for locating faults having a resistance up to 2,000 ohms. It may, however, sometimes be successful on somewhat higher resistance troubles.

After the tone has been connected for locating a wet fault, for several minutes it should then be disconnected and the resistance of the fault checked. If the resistance remains approximately constant or lowers during the time the tone was connected to the faulty pairs, it is an indication that the trouble may be located by this means. On the other hand, if the resistance rises considerably, due to the tone application, different groups may be selected and the test repeated until groups are found

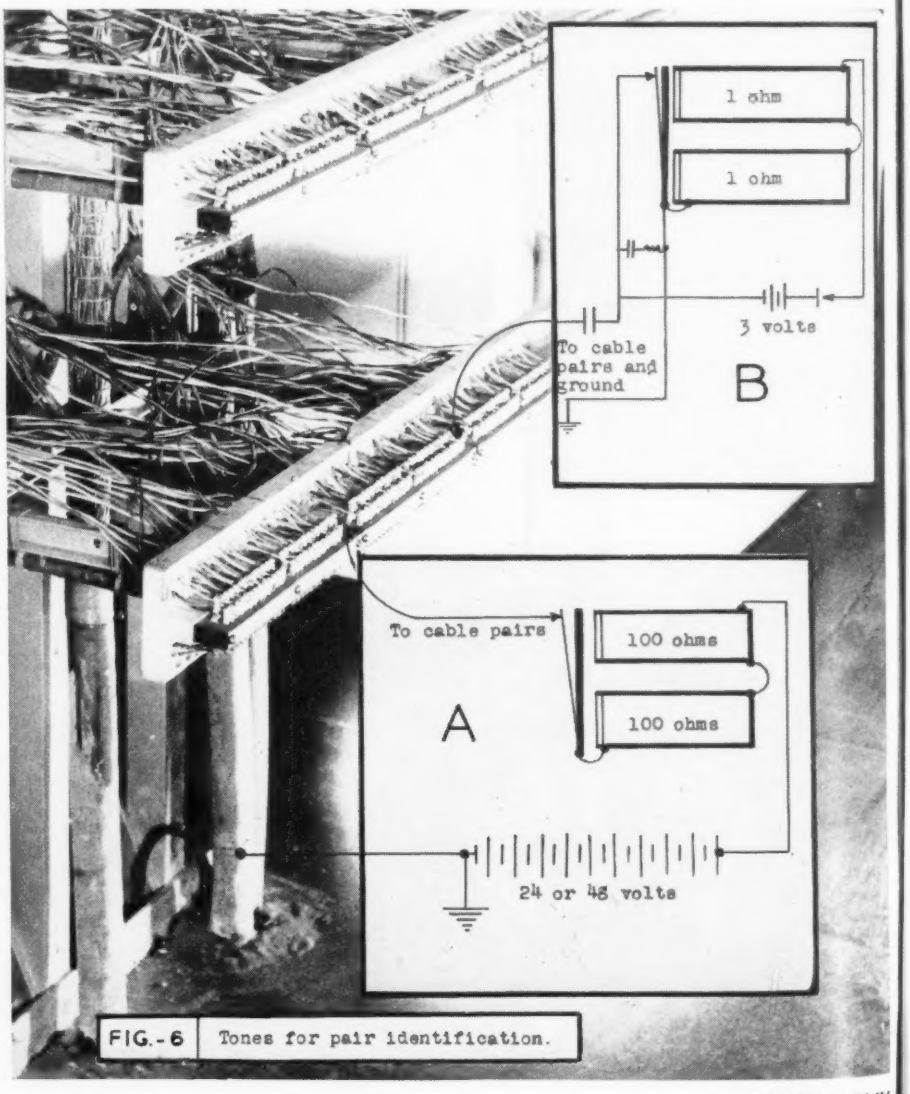


FIG.-6 Tones for pair identification.

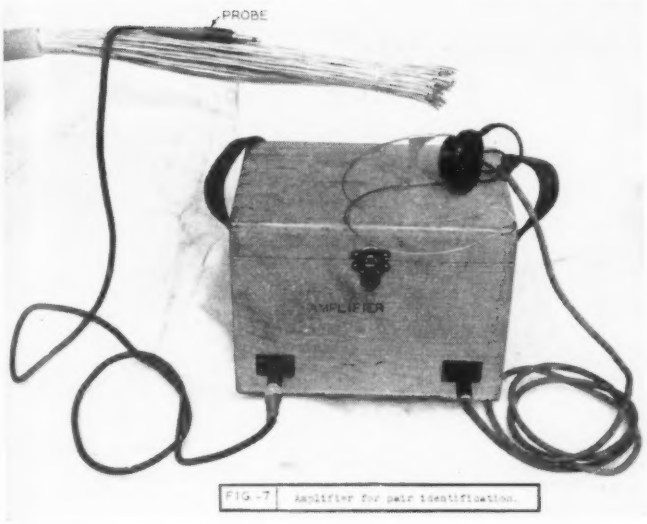


FIG. 7 Amplifier for pair identification.

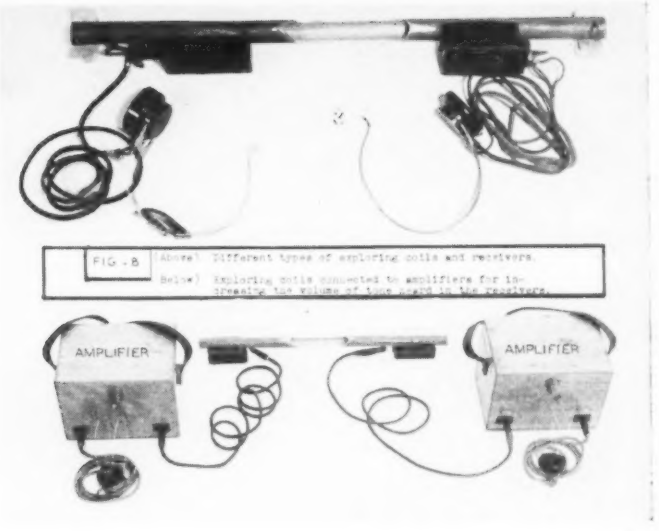


FIG. 8 (Above) Different types of exploring coils and receivers. (Below) Exploring coils connected to amplifiers for increasing the volume of tone heard in the receivers.

FIG. 9 Locating buried cable, tone exploring coil and amplifier method.

FIG. 11 Home made coil for locating buried cables.

whose resistance remains comparatively constant.

The ohmmeter may be connected in series with the tone and fault while the tone is in operation. In this manner, the action of the resistance, whether it rises or lowers, due to the tone application, may be observed, after which, the meter may be removed from the circuit, while the fault is located with the exploring coil and receiver.

It should be remembered that when attempting to locate any cable trouble by the tone and exploring coil method, only a solid short, cross, or ground, will stop the tone dead at the fault; also, that the resistance of the moisture trouble controls the volume of tone heard on either side of the wet spot in the cable. Therefore, it is extremely important when listening for the tone, to carefully note any decrease along the cable in tone volume because, in many cases, the drop in volume will be the only indication of the trouble location.

Fig. 3 shows a tone and exploring coil outfit, which is powered by two ordinary dry cells.

The vibrator is of a slow type, and runs continually while the switch is at the on position.

Following printed instructions in the cover of the set, as to the method of selecting and connecting the faulty pairs to the set, should always be followed.

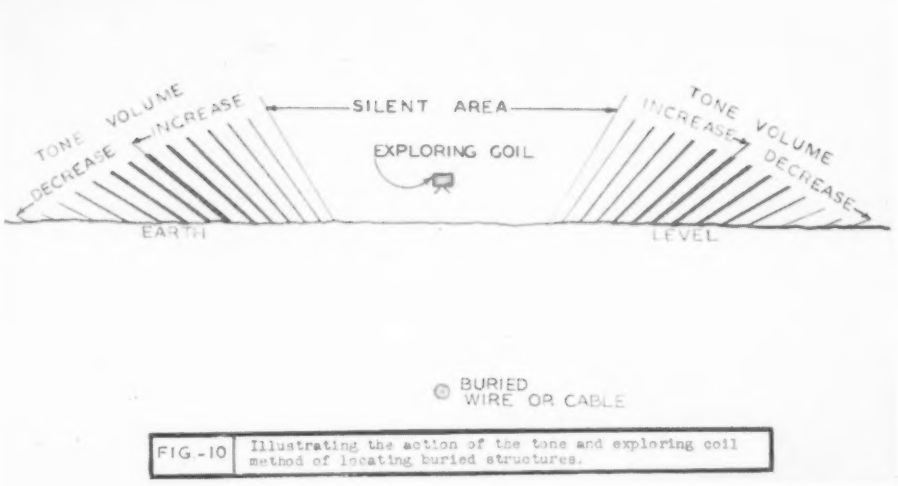


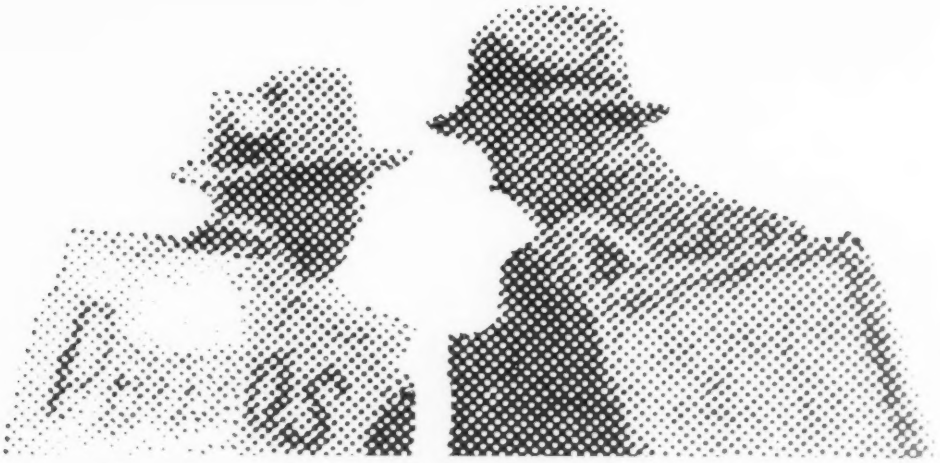
FIG. 10 Illustrating the action of the tone and exploring coil method of locating buried structures.

Detecting Cable Failures in the Making

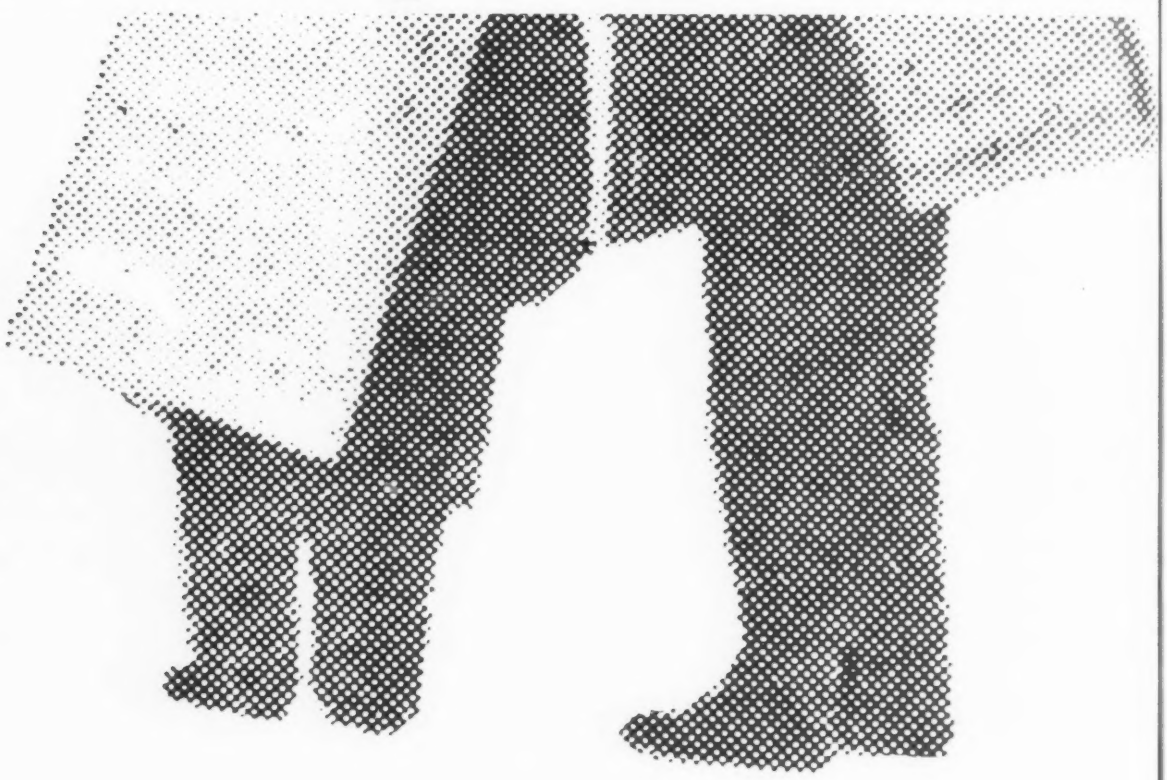
When preventive maintenance tests with the ohmmeter show fault resistances of a high order, 10,000 to 100,000 ohms, and even higher, we may be sure that a cable failure is in the making, unless it is located and cleared.

The tone and exploring coil method is not applicable for such faults; therefore, some other means must be found as a location test.

(Please turn to page 48)



A magneto exchange's best advertisemen.i



In your advertising you can *say* how good you are. But with this Leich 900 magneto telephone you can *prove* it.

Smiling customers will marvel that this compact, beautiful instrument is a complete magneto telephone. When you tell them they can use it as a table model or for wall installation, they'll *really* be pleased.

And when they actually experience the excellent transmission, when they ring central with the handy, easy-to-turn generator crank . . . then they'll know you're their favorite telephone man.

You profit in other ways too. For this Leich 900 telephone will serve long and well without maintenance. And when you convert you can use this same telephone for common battery or dial operation.

If you aren't using this telephone, write us today for complete information. Address Leich Sales Corporation, 427 W. Randolph, Chicago 6, Illinois.

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LEICH 900 MAGNETO TELEPHONE

CH MANUFACTURERS OF TELEPHONES, SWITCHBOARDS AND RELATED APPARATUS SINCE 1907

New Developments In Communications

PART I

[EDITOR'S NOTE: *This is an address presented by Mr. Blain before the Plant Conference at the recent convention of the United States Independent Telephone Association.*]

* * *

By RAY BLAIN*
Member
USITA Plant Committee

1. General

THE Independent telephone industry is ever on the alert in its search for new ideas, methods, tools and equipment that will prove better and more economical in the provision of good, reliable telephone service. The history of our industry, down through the years, indicates constant changes and betterments. There is every indication that changes will continue to be made and that these changes will contribute to the progress of telephony.

The following new ideas are offered for your consideration. It is our opinion that you would be well advised to consider the possibility of adapting them to your operations. It is with this thought in mind that the Plant Committee is undertaking this means of advising the Independent telephone industry of new methods, tools and equipment available.

2. Equipment

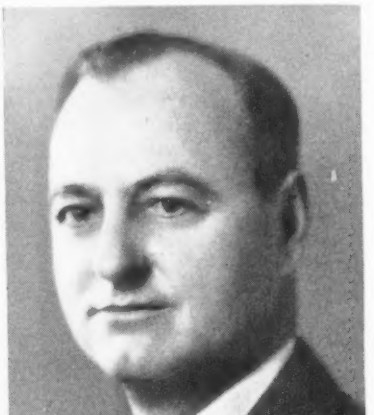
2.01. *Recent Developments in Electronic Switching.* A considerable amount of research and development work is being done throughout the world on electronic switching. Today, vast quantities of electronic equipments are in use in telephone exchanges and recently mechanical-electronic exchanges have been introduced where electronic apparatus is used to control switching functions. It is apparent that the rapid developments in electronic systems, greatly accentuated by the war effort, are advancing the date upon which electronic telephone switching exchanges will become available.

The advantages of the all-electronic system should be: (1) A reduction in weight and space required; (2) freedom from contact trouble, providing a quieter talking circuit free from contact noises which are sometimes produced by contacts in mechanical switching systems, and (3) less susceptibility to dust, temperature, and humidity.

The disadvantages existing at the present time are: (1) The power required for vacuum tube filaments, and (2) the relatively short life of vacuum tubes requiring a greater amount of automatic supervision of circuitry.

Several methods of electronic switching have been investigated. One is based on pulse time modulation, another on pulse frequency modulation, and a third on pulse code selection with intelligence transmitted by pulse amplitude modulation.

The system in which the switching functions are carried out by pulse code selection using the decimal or binary code system is interesting. In this system, the talking paths are carried out on pulse amplitude modulated time division multiplexed circuits in which



RAY BLAIN

any per cent of the subscribers, according to traffic requirements, can be engaged in two-way conversations. Toll facilities can also be provided. Amplification can be given for each connection. Thus, a less expensive grade of outside plant should be permissible.

Inexpensive electronic memory circuits may replace the expensive memory of an electromechanical switching system. The selection of a large number of channels can be achieved by a small number of code elements. It is not beyond the bounds of possibility that one cathode ray storage tube may replace 128 conventional electromechanical switches.

Recent improvements in transitors, giving them extremely long life, together with the fact that they do not require power such as vacuum tube filaments, indicate that they may be used in electronic switching systems to replace vacuum tubes. This should overcome one of the serious objections to electronic switching systems. Selenium rectifiers and crystal diodes, such as the germanium rectifier, which have very long life and whose cost of manufacture is becoming less due to the enormous increase in their use in television and electronic circuits, provide cheap gating means to replace the more expensive electromagnetic relays in performing switching functions.

In conclusion, it might be stated that the great advances now being made in electronic circuitry, apparatus, and component parts, the reduction in cost due to quantity used, indicate the probability of the introduction of electronic switching telephone exchange systems for public use. This is a view that appears on the horizon as another advance in the telephone art, departing radically from the electromechanical systems of the past half-century.

2.02. *Fire Dispatching System.* When a community is served whole or in part by a volunteer fire department, a sense of civic responsibility has placed the operating telephone company serving the same area in the fire dispatching business. This is a most important function as the promptness of the response to a fire call has always been in direct proportion to the efficiency of the dispatching system.

The high cost of maintaining a fire department dispatching system on a 24-hour basis to care for information dispatching at the time of an emergency has generally been ruled prohibitive in most medium and small sized cities and towns, and in the majority of cases this duty has been delegated to the operating force of the local telephone exchange. This dispatching service has always presented a problem since fires frequently occur during periods of peak traffic loads when facilities are loaded to near capacity and mistakes could prove disastrous.

Through the adoption of good voice recording equipment, it is now possible to eliminate the telephone operating force from the fire dispatching system and increase the speed, efficiency and accuracy of dispatching information to the individual firemen of any fire department.

When the Middle States Telephone Co. of Illinois decided to convert its Park Ridge and Des Plaines telephone systems from manual to dial operation,

*Mr. Blain is chief engineer, Plant Engineering Agency, U. S. Army Signal Corps, and technical editor of TELEPHONY.

one of the first problems to be considered was that of handling fire calls under the new system. The cities of Park Ridge and Des Plaines are two suburban communities located immediately northwest of Chicago, having populations of 16,500 and 15,000 respectively. Both have regular full-time and volunteer firemen, and devising a method to notify the volunteers under the dial system was one that tested the ingenuity of both the fire department and the telephone company personnel. (TELEPHONY, June 16, p. 18.)

Under the manual system, the telephone switchboard served as an information center for volunteers who called the operator for the location of the fire. With the introduction of dial service, this practice was no longer possible since, to report a fire, the calling party dials the fire department number direct and the telephone operator is not in on the connection. Thus, it became imperative that some method be conceived to provide for this all-important function.

It was finally decided to make use of a voice recorder that could be dialed direct by the volunteer firemen and others to obtain the required information. A magnetic tape recorder with a continuous loop of tape that repeats a nine-second message was selected as the best suited to this need.

The next step in the development of the dial call system was the connection of the recorder with the dial telephone system. This was accomplished by the installation of a 10-call conference circuit. With this arrangement it is possible for firemen to dial a special three-digit code and be connected immediately with the recorder.

When a call is received at the fire station, whether by telephone, pull box alarm, or by a personal report, the fire department engineer on duty immediately closes the "main" switch on the recording machine to prepare it for operation. A period of about 15 seconds is required to warm up the electronic tubes. Upon receiving the location of the fire or inhalator squad call, he closes the "record" switch to the "start" position and dictates the location, repeating it several times into the microphone. A recording of the message has then been made on the magnetic tape which is ready for the "play back" which then occurs automatically.

When the recorder starts playing back the message, it is heard over the loud speaker which permits the fireman to monitor the message which has just been dictated.

The fireman on duty at the station then closes a switch that operates the fire house siren and bells located in each fireman's house. The firemen hearing the bell or siren goes to the nearest telephone, dials the special three-digit number which connects him over the conference circuit to the recorder and he hears the location of the fire being repeated over and over. A minimum of 9½ seconds is required to dial and receive the fire location. A longer time is necessary if a repeat is desired. The special number called to receive the fire location is known only to firemen, but, in the event it becomes known by others, it can be changed easily.

After recording the location and actuating the alarm signals, which require approximately 30 seconds, the firemen on duty at the station immediately proceed with the equipment to the scene of the emergency. It is not necessary to wait at the station for other firemen or volunteers since they obtain all necessary information by dialing and listening to the recording. The conference circuit will handle 10 calls simultaneously without giving a busy signal. If a busy signal is received, the number can be redialed in five seconds and the connection is usually completed on the second attempt. The tape recorder runs its message continuously until it is shut off by the fireman when he returns to the station.

A new message can be recorded at any time by momentarily pressing the "record" switch to the "start" position. This will erase the previously recorded message and prepare the tape to receive the new message. The recorder also has dual controls and may be operated from either of two locations in the fire station. Facilities have also been provided to operate the recorder manually in the event of a failure of the commercial power. A local battery telephone handset is provided so that one of the firemen can talk directly over the conference circuit in place of the recorder sending the message. Batteries are provided in the main unit for transmission purposes. The handset can also be used in the event of multiple fire alarms.

This fire and emergency call system has now been in operation at Park Ridge and Des Plaines since June, 1950, and has successfully met all requirements. It has also received high praise from many sources because it provides one of the fastest and most reliable systems in service anywhere by which a fire department can so quickly summon its volunteers.

2.03. *Battery Eliminator for Paystation Operation.* This battery eliminator, designed for use in connection with paystations, supplies 120 volts positive and 120 volts negative for operation of coin collect and return magnets. The rated output of this unit is .25 ampere continuous, .60 ampere intermittent, which will be found adequate for all except the larger exchanges. Both positive and negative outputs can be loaded simultaneously. . . .

Output voltage taps provide a choice of either 110, 120 or 130 volts output and line voltage taps adapt this unit for normal input voltages of 111, 117 or 123 volts at 60 cycles.

This unit is housed in a ventilated steel cabinet with a gray-green wrinkle finish.

2.04. *Nickel Cadmium Alkaline Storage Battery.* The principal feature which distinguishes the nickel cadmium alkaline battery is that it is not subject to sulphation or any other similar deterioration.

The active material of the positive plate in this battery consists of nickel hydroxide and specially treated graphite. The active material of the negative plate is a mixture of oxides of cadmium and iron.

The electrolyte is a solution of pure caustic potash (KOH) in distilled water, the solution having a normal specific gravity of 1.190. The density of the electrolyte does not change appreciably on charge or discharge, thus making it unnecessary to take frequent hydrometer readings or to keep detailed specific gravity records.

The chemistry of this cell is noteworthy in that it contains neither lead in its construction nor acid as an electrolyte, but in place of these materials employs nickel-plated steel and a caustic potash solution. The steel plate frames and the steel pockets take no part in the chemical reactions which are entirely confined to the active materials enclosed in the latter. On charge, the positive active material is oxidized and the negative active material reduced. On discharge, the opposite occurs. The electrolyte functions virtually as an electrical conductor only and does not enter into any permanent chemical reaction with the active materials. For this reason, its specific gravity remains constant on both charge and discharge and, provided the plates are covered, the electrical capacity of the cell is independent of the volume of its electrolyte. Hence, the quality of electrolyte required can be reduced to a minimum and the plates placed very close to each other, resulting in a low internal resistance and consequently high capacity at high rates of discharge.

The positive and negative plates are identical in mechanical construction and external appearance. The active materials are contained in finely per-

forated thin flat steel pockets seamed together along their edges and then locked into a steel plate frame, thereby forming individual plates. The design of the pockets containing the active materials is one of the most important features of this new type of cell and is largely responsible for its special characteristics. The plates are individually subjected to a pressure of several hundred tons so that good electrical contact is obtained between the active materials, the pockets in which they are contained and the plate frame.

The process of pressing renders the plate rigid and at the same time forms indentations which increase the surface exposure to the electrolyte. A complete plate group consists of a number of alternate positive and negative plates assembled on bolts and to terminal posts common to plates of the same polarity. The plates are insulated from one another by means of polystyrene rod separators resting on vertical grooves in the plate faces.

The steel terminal posts lead through liquid-tight rubber glands in the top of the cell can and carry nuts which clamp flat strip-type intercell connectors. In case of necessity, these connectors may be removed without the use of any special tools. The cell cans are liquid-tight containers made of welded steel. Each cell is fitted with a combination vent and filler opening. All steel parts are nickel-plated.

The charging of the nickel cadmium battery may be carried out by the constant current, the constant voltage, or the modified constant voltage method. The seven-hour rate is regarded as the normal charge rate when charging at constant current, but practically any charge rate may be employed provided the time of charge is adjusted proportionately. On normal constant current charge, a progressive rise in voltage occurs from 1.35 to 1.75 volts per cell.

At normal rates of discharge, the voltage of the nickel cadmium cell drops slightly during the first few minutes, but remains practically constant therafter until near the end of the discharge. The average discharge voltage at normal rates of discharge is generally regarded as 1.2 volts per cell. The lower individual cell voltage confers upon it an ability to meet difficult voltage conditions. A charged battery of this type left standing on open circuit will be found capable of giving a large percentage of its capacity even after a period of several years.

The efficiency of the nickel cadmium battery under normal conditions is 60 to 65 per cent on a watt-hour basis and 75 to 80 per cent on an ampere-hour basis during practically its entire life.

2.05. *Automatic Time Announcer.* The automatic time announcer is a complete and self-contained unit which permits operating companies to supply telephone users with accurate verbal time announcements from recordings on a magnetic tape. It is particularly adaptable to dial exchanges of all types as well as manual exchanges where personal time announcements by an operator may be inefficient or costly. The machine delivers announcements every 15 seconds, employing the usual pattern of, "at the next tone signal, the time will be_____," followed by a tone signal exactly on the 15th second. The completely automatic service provided by the time announcer avoids the expense and possibilities of error which are incurred when time announcements are given by operators.

The announcer is essentially a magnetic tape reproducer which operates under the control of a master clock. All of the required time announcements on the tape are pre-recorded in the proper succession by a professionally trained voice. Announcements are recorded for only 12 hours service since no distinction is made between a.m. and p.m. time. The tape is merely run twice to obtain the required 24 hours' service. Because the reels hold only enough tape for a six-hour run, two sound tracks are recorded on the single tape. These tracks run in opposite directions and the "capstan" drive is arranged to reverse direction every six hours. Reversal of the capstan motor is controlled from the master clock. An additional track recorded on the tape consists of a series of (non-audible) synchronizing signals.

In conjunction with the time announcing function of this machine, facilities can be provided for introducing a six-second commercial announcement (advertisement) before each time announcement. When commercial announcements are employed, a full cycle consists of (1) commercial announcement, (2) time announcement and (3) time tone signal.

The announcer operates on 115-volt, 60-cycle power and may be plugged into any convenient outlet. The master clock mechanism is driven by a 115-volt, 60-cycle synchronous motor. Accuracy of the announcements is, therefore, dependent upon the power supply frequency and in communities where the speed of the alternators is carefully regulated and checked against officially recognized time standards, the time announcer will provide highly accurate service. In localities where the commercial power frequency is not dependable, or is not accurately regulated, the clock motor may be driven by a crystal-controlled oscillator or a tuning-fork oscillator which delivers sufficient 60-cycle power (7½ watts) to operate the motor.

The time announcer develops sufficient output power to handle at least 50 calls simultaneously. Furthermore, no appreciable change in volume is noted at a connected subscriber's station regardless of whether the time announcer is lightly or fully loaded, i.e., whether few or all of the trunks to the announcer are in use.

To prevent subscribers from occupying announcer trunks for unduly long periods, provision is made in the equipment whereby a subscriber can be automatically disconnected from the trunk after a pre-determined number of announcements.

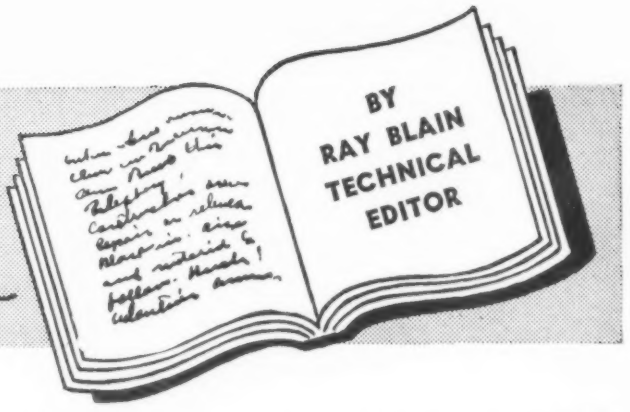
Connections are provided for wiring the announcer to central office alarm equipment to provide indications of abnormal operation.

2.06. *Automatic Message Metering System.* The Strowger automatic message metering system (SAMM) is a natural extension of the Strowger automatic toll ticketing system (SATT). It is an application of the same basic principles of metering individual subscriber's local calls and recording the information on punched tape in a manner very similar to the methods used in the SATT system. It can be used in SATT equipped exchanges or it can be used alone. The economic advantage is, of course, greater in SATT exchanges because of the common equipment.

Whenever a subscriber initiates a local call a piece of apparatus called the SAMM counter, which is installed between the linefinder and first selector, controls the identification of the calling party. This identification is effective by means of the same detector that is used for SATT system operation, if SATT is installed, or by a detector that might be modified if SATT is not installed. When the called party answers, the calling party's number is stored in a tabulator and on completion of the call this information is recorded on a punched tape. At periodic intervals the tape is put through a tape to card punch and business machine cards are made for each separate local call. These cards are then sorted and processed by the business machine which totals up the calls made each month by each subscriber and produces bills accordingly. Each card can be used for from 10 to 16 calls.

(Please turn to page 53)

THE PLANT MAN'S *note book*



BY RAY BLAIN TECHNICAL EDITOR

LONG time friend of the writer, Charles F. Robinson, telephone engineer for the Signal Corps, Headquarters Third Army, Atlanta, Ga., makes the following observation of buried cable installations in that area:

"In the construction of buried lead cable without the protection of duct, jute or tape armor, it has been found in the states of North and South Carolina, Florida, and parts of Georgia, where the soil is of sandy loam, that buried cable plant installed in 1941 is still providing good service. Neither does this cable show any noticeable signs of deterioration.

"In the clay soil of Tennessee, Alabama, Mississippi, and parts of Georgia, however, deterioration of the unprotected lead sheath starts after a few years of service, with complete replacement being necessary within a ten-year period. When it becomes necessary to bury cable in the four states mentioned, it is believed necessary that it be treated with a coat of acid-proof paint before installation. Or, if this is not done, the cable should be placed in a cushion of sand to retard corrosion."

• • •

It has been said: "Egotism is what makes some people able to live with themselves."

• • •

In a recent attempt to have a telephone installed in a new house for a friend, we advised the telephone company that this chap urgently needed a telephone since his wife was going to have a baby.

The official of the telephone company advised us that this no longer was considered a valid reason for a telephone priority since everybody who does not have a telephone has a wife who is expecting!

• • •

Since mentioning special insulating covers for the handles of pliers on this page recently, we have been advised that various other types are also available.

To mention a few, heavy rubber vulcanized handles provide good insulation. This type is not adversely affected by the weather, but its dielectric value is not guaranteed.

Then, there are the red plastic handles with deep knurling for a positive, but comfortable grip. Non-burning and non-explosive, they will stand up under extreme temperature changes. These are easily applied—just hammer them on.

Also, there is the "Cushion Grip" dipped plastic handle designed to give extra comfort. Standard colors of this type are red, blue and black.

These grips are all good and definitely an improvement over the old-fashioned tape-covered handles of yesterday.

• • •

Someone has said that a professional man is a man who can do his job when he doesn't feel like it.

An amateur is a man who can't do his job when he does feel like it.

• • •

According to Frieda B. Hennock, member of the FCC, television, in the hands of capable teachers, can be one of the world's greatest instruments for the elimination of prejudice and the creation of a higher standard of culture than mankind has ever before experienced.

• • •

The writer attended a cut-over recently at which an old manual system was converted to dial operation.

Early the next morning several complaints were received from customers who didn't like the dial service for they claimed they lost too much time looking up the numbers in the directory.

We should like to wager, however, that after they have used both the directory and the dial for about a month they all will like it and will not care to go back to manual operation.

• • •

We are told by experts that there are any number of countries equally as rich in human and natural resources as the United States. The thing that makes the difference between abundance and poverty is the wise and efficient use of tools. Approximately 95 per cent of our productive energy is provided by tools. Only 5 per cent represents animal and human energy.

• • •

The U. S. Army Signal Corps has developed a new type of dry cell battery which substitutes plentiful low-grade domestic manganese dioxide for the high grade product found in sufficient quantity only on the African Gold Coast. The life expectancy of the new battery is twice that of the conventional type.

Dry cell batteries, which have some 1,000 military applications, are purchased for all the Armed Forces by the Army Signal Corps.

The manufacturing cost of the new type battery is expected to be slightly higher, although substantial economies will result from its double service life and from the reduction in storage and shipping costs.

• • •

Someone has said that knowledge without experience is water with no pitcher in which to carry it.

• • •

When young people move into a new house today, they are not satisfied until they obtain a telephone, and it is often necessary for them to wait a long time for this service. Then, because of the general shortage of facilities, they are usually placed on a party line. Next, they begin clamoring for a line with fewer parties, or an individual line.

With the general increase in population throughout the country, we wonder if the time will ever arrive when everyone can have the type of telephone service desired.

A brother of the writer moved into a new house in a new section of San Diego, Cal., about a year ago. He is still waiting for a telephone and using the outdoor booth installed on a corner over a block away. And he doesn't like it either!

PLANT MAN'S QUIZ

Q. Is there any objection to attaching guys to trees to anchor an open wire line which runs through large timber?

A. When trees are of adequate size and strength, there is no objection to attaching guys to them providing, of course, permission can be obtained from the property owners.

The best method of attaching a guy to a tree is to bore a hole and place an eye bolt through the tree. This bolt should be either through the trunk or through a large limb near the trunk. This method will not injure the tree, but if the property owner objects, the guy may be wrapped around the tree which should be protected by tree blocks in the form of shims. These blocks will prevent the tree from growing and covering the strand.

• • •

Q. Is a peaked, or a one-cut roof considered best for a treated southern pine pole?

A. In our opinion, either method is entirely satisfactory; however, the one cut roof is more generally used at the present time.

Actually, any kind of a roof is considered adequate. We have yet to hear of any treated southern pine pole decaying from the top regardless of whether it is roofed or not.

The pole should, however, be roofed by some method and gained prior to treatment.

• • •

Q. When the wrap method of guying is used, is there any objection to placing double strain plates on the pole to protect it from the choking effect?

A. This practice is often used and proves entirely satisfactory in most cases.

Another method is to lap the strain plate about half-way, in the same way as shingles are laid, which actually gives more holding power than when double strain plates are used.

• • •

Q. Is it considered desirable to provide an emergency gasoline engine operated generator in an exchange of approximately 1,000 stations to be used in the event of failure of the commercial power supply?

A. This will depend to a great extent upon the reliability of your commercial power supply, and the reserve capacity of your storage battery. Actually, we doubt that any telephone exchange can be considered complete without an adequate emergency power supply.

If the commercial power fails for even a few hours at night, the provision of emergency lights may prove quite a problem. On the other hand, if an emergency power generator is provided with adequate capacity to carry the exchange and the lighting load, then your worries are over.

In our opinion, an emergency generator will prove a good investment in any modern telephone exchange.

• • •

Q. What is the meaning of the term "corrosion protection" of underground cable?

A. It is a well known fact that damage to lead-covered cable, which is due to electrolysis, occurs only where positive current flows from the sheath to earth or some metallic underground structure. To create this condition and have current flowing from the sheath to earth or other underground structure, we must also have current flowing to that cable sheath at some point.

Therefore, it is reasonable to assume that any current that can be prevented from flowing to the cable will reduce the amount of current leaving the cable in the positive area.

Lead-sheathed cable with an asphalt and jute protective insulating covering will reduce the current flow both to and from the sheath. Lead-sheathed cables with a plastic jacket have also been developed for the same purpose and this type of cable should prove most effective for such projects.

• • •

Q. Please explain why joint power and telephone lines are not more generally used in rural areas.

A. This is a "live" question. One fact that must always be considered is that in most parts of the country, telephone lines were well established when electrical lines were extended into the rural areas.

Another reason is because of the technical difficulties of coordination between the two services in most rural areas. This difficulty of coordination is due to the use of generally higher voltages on power circuits, operated in such a manner that disturbance levels are higher when coupled with telephone circuits, which are generally open wire and which are more susceptible to inductive interference.

The inductive interference levels are far in excess of those which are generally encountered when power and telephone circuits are operated at highway separations. These high interference levels require that rural circuits on jointly used poles be constructed and maintained at a high degree of balance and insulation and these requirements apply equally to the station equipment.

High impedance ringers are preferable and probably a necessity if divided ringing is used.

A greater number of telephone line transpositions are required and wire may have to be placed on crossarms rather than installed on brackets. Moreover, higher voltage protective equipment is necessary and special methods must be used in some cases such as the installation of drainage coils.

These special methods are required when noise levels remain high after all normal precautions have been taken.

The use of joint poles present numerous special problems and expense for the telephone company that in many cases offset any savings that may be realized by the use of joint poles.

• • •

Q. Will it be possible to make use of an open flame torch in lieu of wiping joints in the repairs of lead-covered cable?

A. While an open flame torch should never be used in a manhole, confined building or other location where explosive gas may be present, there are numerous places where it can be used to advantage in cable work.

The seam in a split sleeve may be run quickly and easily by the use of a torch and stearine core solder. Smaller sizes of lead sleeves may also be soldered to the sheath in a similar manner with the expenditure of a minimum of labor and material.

Many small sheath openings made for the clearing of trouble may be closed economically by soldering with a torch. This is especially true where pairs are cleared without removing entirely a section of the sheath. Power and lightning burns as well as small moisture faults often may be cleared by slitting the sheath, clearing the trouble by insulating the wires with tape, and soldering the opening with a torch.

This method may likewise be used to clear small moisture faults by adding desiccant through the slit in the sheath.

MAINTENANCE TESTING EQUIPMENT

By JOHN A. BRACKEN

EXPERIENCE proves that relay equipment which is adapted to meet successfully the service requirements of a particular telephone system does develop operating trouble. The purpose of testing this relay equipment is to discover and localize the common faults relays are susceptible to, and the ultimate objective is to restore and maintain the maximum operating efficiency of the relay equipment. Therefore, in performing these tests, the better the tester is acquainted with the fundamentals of relay operation and associated circuits, the easier it will be to test for and detect trouble.

The operation of relays involves the effects of such phenomena as magnetism and electricity. Relative to the exact nature of these phenomenal effects, it is said that there are many theories, much debate, and nothing definite. However, for all practical purposes they may be looked upon as forms of energy, having their own peculiar characteristics readily adaptable to the operation of relays.

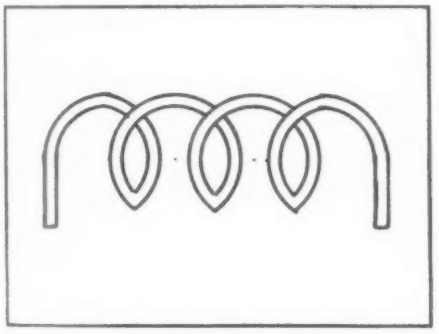


Fig. 1

Electricity is applied to the operation of relays as a stream of electrons, called an electric current. Physicists inform us that the flow of electrons through a conductor must be set in motion. The force which causes the electrons to move is called difference in potential or simply electromotive force (EMF).

In exactly the same way that EMF is looked upon as a force that causes a stream of electrons to flow from one point to another in an electrical circuit, a difference in magnetic potential, called magnetomotive force (MMF), is looked upon as the force that moves lines of magnetic force through a magnetic path against the reluctance—a

PART 44. The preceding article in this series appeared in the Oct. 20 issue, p. 20.

term used to express the opposition offered by a substance to the passage through it of lines of magnetic force.

Actually, lines of magnetic force, and the idea it conveys, are purely imaginary, and serve only as an aid in attempting to explain the magnetic action which takes place.

Magnetism is so related to electricity that it may be created by an electric current flowing in a conductor.

If a piece of insulated copper wire is formed into a spiral or coil, as shown in *Fig. 1*, and then slipped over a rod of soft iron, technically called a core, and current is sent through the wire as indicated in *Fig. 2*, lines of magnetic force encircle the entire length of the wire through which the current flows and the iron becomes magnetized. The arrangement is called an electromagnet. The path followed by the lines of force is called the magnetic circuit.

The facility of the passage through it of lines of magnetic force offered by

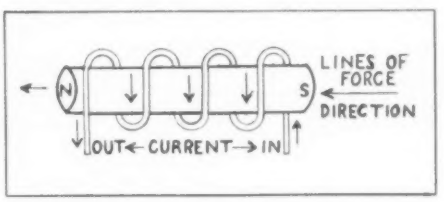


Fig. 2

the soft iron core, is called permeability and corresponds roughly to electrical conductivity, and may be defined as the ratio of the relative magnetic conductivity of a substance to that of air which is taken as unity, or one.

However, there is an important difference between permeability and electrical conductivity. The latter in regard to any specific conductor does not vary, provided the temperature remains constant, whereas permeability varies with the magnetizing force. Owing to the permeability of air, as well as many other non-magnetic substances being taken as unity, if the soft iron core shown in *Fig 2* has a permeability 2,000 times that of air, the number of lines of force will be greatly intensified, and the core strongly magnetized. Actually the presence of the iron core in the coil multiplies the number of magnetic lines, thereby offering an easier path for the flow of the lines of force by lessening the reluctance and causing a corresponding increase in the magnetism.

The capacity of the iron core for carrying lines of force may be compared to the capacity of a sponge for soaking up water. When the sponge contains only a little water, it will readily absorb more, but when the sponge has taken up as much water as it will hold, it becomes saturated. When the core of a relay electromagnet is carrying about as many magnetic lines of force as it can, the maximum magnetization which can be imparted to it is reached. It then is said to be saturated and will not be further magnetized.

The design of the magnetic structure of a relay is based mainly upon the pull the armature must exert in order to move the contact spring combination a given distance. This magnetic structure consists of a winding, iron alloys, and in some cases steel. The magnetic quality of the metal selected is governed by its physical condition and chemical composition, depending, of course, upon the requirements of a particular type relay with respect to its efficiency of operation. *Figs. 3, 4* and *5* illustrate some very common types of relay magnetic circuit structures.

Although relays are designed to operate on current of various values, the magnetic field set up about a given

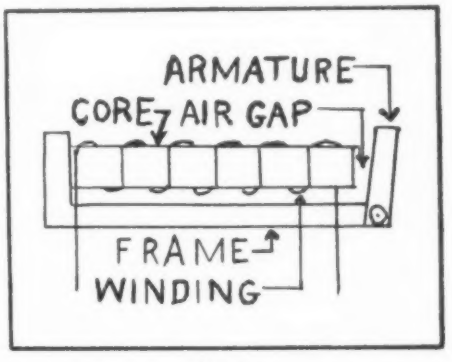


Fig. 3

(Please turn to page 60)

telephony's *SAFETY* bulletins

No. 27—GUARD AGAINST INFECTION. Any wound is a possible source of dangerous infection. Read this bulletin for a review of the safe things to do to avoid infection.

by FRANK E. LEE

AN infected wound can be very dangerous. Whenever there is infection you will find pain and discomfort—a chance of loss of a limb, and even the possibility of death. Why take a chance? Instead, take care of the wound and use every precaution to avoid infection.

The skin acts like a protective envelope for the body. When this protective coating is broken, germs can enter the body. Ordinary infections usually start where there is a break in the skin. Cleanliness is the watchword in combatting possible infection. Cuts, scratches, wounds, should always be cleansed well. Ordinary toilet soap and water do a good job, and are acceptable measures from a medical standpoint.

Mercurochrome and iodine are helpful, but should not be used on a dirty wound with the feeling that they will thus be a safeguard. Dirt must first be removed. In the case of scrapes, where dirt is ground into the skin, a soft bristle brush will help with the cleaning job.

After the wound is cleansed, it should be covered with a clean bandage, which should be changed daily. Whenever the bandage is changed, the injury should be carefully examined for signs of infection. Such signs are abnormal redness, burning sensation, tenderness, swollen glands in the region of the wound, red streaks radiating from the injury. Should any such signs be noted, a physician should be consulted at once. In case a doctor cannot be reached for some time, applications of hot salt solution are helpful. The salt solution may be made by adding three heaping tablespoonfuls of ordinary table salt or six tablespoonfuls of Epsom Salts to each quart of boiling water.

Use the solution as hot as is comfortable, but take care not to scald the area. If possible, soak the infected part in the same container in which the solution was boiled. If this is not possible, apply the solution by means of a large compress, cloth, or clean towel. When using such a compress, wring it out often enough to keep the compress hot. The soaking process should be kept up for at least an hour. Such first aid treatment is for emergency only—a physician's services are needed, as modern drugs can usually make short work of infection.

Proper care of even the smallest wounds will prevent most infections. Very little time is required, and where your well-being is concerned—*YOU HAVE TIME FOR SAFETY!*

TELEPHONY'S SAFETY NOTES

Causes of Accidents

(1) Improper or Inadequate Training.
(2) Lax Enforcement of Safety Practices. (No substitute for on-the-job supervision.)
(3) Workmen do not realize or accept responsibility to keep from getting hurt. (Carelessness or thoughtlessness.)

Herbert Hoover recently dealt with the subject of honor in public life. The ex-President said: "Dishonor in public life has a double poison. When people are dishonorable in private business, they injure only those with whom they deal or their own chances in the next world. But when there is a lack of honor in government, the morals of the whole people are poisoned. . . .

"Our strength is not in politics, prices, or production, or price controls. Our strength lies in spiritual concepts. It lies in public sensitiveness to evil. . . .

"The issue is decency in public life against indecency.

"Our greatest danger is not from invasion by foreign armies. Our dangers are that we may commit suicide from within by complaisance with evil. Or by public tolerance of scandalous behavior. Or by cynical acceptance of dishonor. These evils have defeated nations many times in human history.

Remember that next time you read of five-percenters, mink coat and deep-freeze "gifts" to government officials and employes, sordid tie-ups between politicians and gamblers, and morally indefensible activities within the RFC and other government agencies. These things are terrible symbols of moral decay.

Telephone Folks Will Play Santa for Thousands of Kids

As you read this, telephone operators all over the country are dressing thousands of dolls for distribution to children's homes and hospitals at Christmas.

Down in Texas, other telephone people are packing gay gift boxes for remote farm families. On December 24, the pilot who patrols Long Distance cables across the lonely plains will drop them by parachute and wave a friendly "Merry Christmas to All" by waggling the wings of his plane.

Throughout the Bell System, thousands of other telephone men and women are collecting food, candy, toys and dollars for those less fortunate than themselves.

It's a long-time telephone tradition — and a rather natural one. The spirit of service and the spirit of Christmas are pretty close together. And telephone folks try to be good citizens *all* year 'round.

BELL TELEPHONE SYSTEM

Small Exchange Construction

(Concluded from page 21)

This wire, developed especially to meet the needs of the telephone industry, is No. 12 B.W.G. with a minimum breaking strength of 1,800 pounds. This new wire combines extraordinary strength with effective voice transmission qualities.

The stringing sags are designed by the manufacturer of HTL-190 so that when the radial thickness of ice is one-half inch, the wind load is two pounds per square foot, and the temperature 0°F., the tension on the line wire will not exceed 60 per cent of the breaking strength of the wire.

Telephone lines strung of HTL-190 will actually withstand a heavier climatic load than this since an ice load of one-half inch radial thickness will cause elastic stretch in the wire with the result that, on extra long spans over level terrain with normal stringing clearances, the ice-covered wire will rest on the ground at the middle of the spans. The ice-covered wire on the ground will be more or less anchored so that this section will not be subjected to stresses by wind loads.

In addition, the ice-covered wire still in the air on both sides of the middle of the span will be stressed by additional wind and ice loads, but the effective span length will be less than half the pole spacing since the middle of the span is resting on the ground. The ice-covered wire is fairly well insulated so that lines in this condition will continue to function even though they do touch the ground. When the ice melts, the unloaded wire will snap back up into the air and the slack will be very little greater than the original sag. This assumes, however, that the pole line is of adequate strength, and properly constructed and guyed.

Lines of extra-long span construction may be strung under the same practices as employed for the conventional types of telephone lines except that a few precautions must be taken to provide for greater weight of the wire on the points of support and the higher tensions. Dead-end and corner poles should be guyed to withstand the increased tensions. Poles should also be located with respect to road crossings and other interferences so that, if the wire sags under ice loading, the line wire will not obstruct traffic.

The load on the ties at insulators is considerably greater than in normal line construction. More attention, therefore, should be taken to the proper protection of the wire where it is tied to the insulators. Some type of armouring should be provided to re-inforce the wire at the point of support. The use of preformed tie splints will prove desirable.

When it has been decided that new telephone facilities must be constructed, decide first what type of plant best meets the needs of your particular exchange. Next, plan it in careful detail and construct it in accordance with the latest approved practices from the best materials available. If these rules are observed, you may be sure that you will have a plant that will give good service over a long period of years and that the cost of maintenance will be extremely low.

V V

Two Indiana Bell Men Receive Vail Awards

For prompt first aid that saved a power line construction worker from death by electrocution, John Wilkins, cable splicer for Indiana Bell Telephone Co., and Roy Lunsford, service foreman, received the Vail Award on Nov. 29 at Bloomington.

These awards, symbol of exceptional public service by telephone men and women, were presented to the two Bloomington men by Charles W. Potter, Indiana Bell general manager, at a dinner at Indiana University.

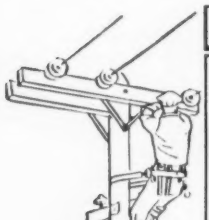
In addition, Wilkins and Lunsford received the Red Cross Certificate of Merit and the President's Award from the National Safety Council from representatives of those organizations.

The honors resulted from action following an accident last July 20 involving James Wilson, who was helping to rebuild an electric power line in Bloomington. Wilkins was splicing a telephone cable across the street and Lunsford was working nearby. They saw Wilson fall—hit by 7,200 volts of electricity. When they reached his side, he was no longer breathing.

Wilkins and Lunsford began artificial respiration at once — a part of their telephone training—and continued it until an ambulance arrived. Doctors credited their prompt and effective first aid measures with saving Wilson's life.

Vail Awards are made from a fund establishd in 1920 in memory of T. N. Vail, former president of American Telephone & Telegraph Co., to recognize outstanding acts of public service performed by telephone employes.

The bronze Vail Medals, which were awarded to Wilkins and Lunsford, are accompanied by $100 in cash.



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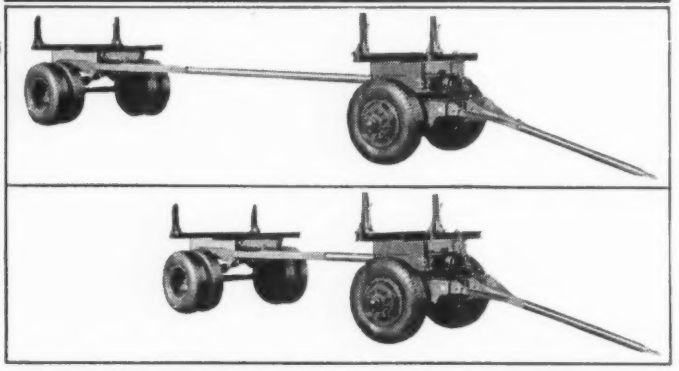

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Extend or shorten the wheel base of this heavy duty pole trailer, easily and quickly, by means of the telescoping center pole. Trails smoothly — without "snaking" or "weaving." Fully reinforced — a big trailer that does a big job. Full 90° turn front dolly — either direction — 5th wheel type steer. 9 tons capacity; over-all length extended, including tongue, 54 ft. 2 inches; telescoped 36 ft. 4 inches. Extended wheel base 40 ft. 3 inches; telescoped wheel base 22 ft. 5 inches. Equipped with electric brakes on rear wheels. Send for complete information on Model 6450 — Eagle Telescoping Pole Trailer.

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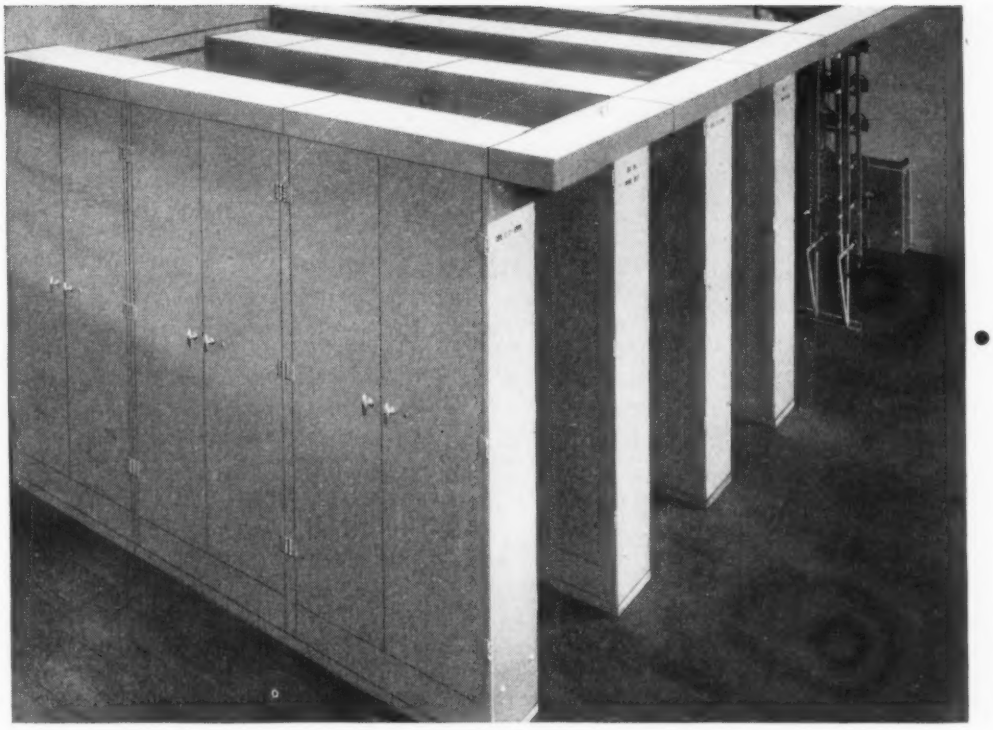

YOUR future expansion

may depend upon

THIS YEAR'S *"guided planning"*

Optimism is a fine diet for any business, IF it is seasoned with a strong dash of logic and farsighted thinking. That is why we keep harping on the belief that shortages, allocations and other restrictions, real as they are, need not handicap any Independent Telephone expansion based upon "guided planning." In other words, if you will sit down with your favorite supplier FAR AHEAD OF PRESSING NEEDS and let him help you plan future installations, the entire industry can synchronize availabilities with eventualities . . . Let a North engineer explain our plan NOW . . .

THE NORTH ELECTRIC MANUFACTURING COMPANY

Originators of ***ALL RELAY*** *Systems of Automatic Switching*

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Most Important Trouble Record

(Concluded from page 23)

several years. Insofar as possible they have shown the "Primary Cause" of each case of trouble in the log. Now something leads them to believe that their open wire trouble is getting out of line. Therefore, they assign to someone the job of digging the *facts* out of the log for the past six months. It may take him several hours to do this as he must look at every entry in the log for six months back and make notations of those cases which were closed to "Open Wire."

Table 1 shows one form his report could take. He has broken down the trouble by months and by causes. The monthly totals show that (except for the month of June) the trouble is steadily increasing. He then reduces the monthly totals to cases per 100 miles of wire. Notice that in April the amount of wire was reduced from 600 miles to 550 miles. A cable extension displaced 50 miles of wire. Although there were 19 cases in March and 19 cases in April, the cases per unit are 3.17 for March and 3.45 for April.

He then inquires of two large companies which have complete trouble records and concludes that 1.80 cases per month per 100 miles would be a normal result for the present time.

ANALYSIS OF OPEN WIRE TROUBLE

CAUSE	Jan.	Feb.	Mar.	Apr.	May	June	TOTAL	Per Cent
Slack Wire	1	2	3	2		2	10	8.3
Bad Splices	8	9	11	10	10	8	56	46.3
Tree Interference	2	1	3	4		3	13	10.7
Lightning				2	3		5	4.1
Cause unknown	1	1					2	1.7
Broken Pin		1					1	.8
Broken Insulator	1					1	2	1.7
Wind Storm					25		25	20.7
Other Workmen		1					1	.8
Pole or guy hit by car			2			1	3	2.5
Tie Wire						1	1	.8
Other Company Wire				1		1	2	1.7
TOTALS	13	15	19	19	38	17	121	100.0
Miles of Wire	600			550				
Cases per 100 mi. of wire	2.17;	2.50;	3.17;	3.45;	6.91;	3.09.		

Note: Conversations with _____ company and _____ company indicate that 1.80 cases of Open Wire Trouble Per Month per 100 miles of single wire is about "Par" at the present time.

Table 1

This information tells him that his trouble is very much out of line for the entire six months under study.

Now what is the cause? The totals by causes show that the largest item is Bad Splices and that this is 46.3 per cent of the total. The next highest item was due to the severe wind storm in May but nothing can be done about that now. The next highest item is "Tree Interference" (trees grown into lead) and this was 10.7 per cent of the total.

Clearly the point of attack is those old hand splices which are going bad. While doing this work they can also take care of any tree interference. He may wish to make another analysis by leads to determine which lead should be worked on first. The object is always to reduce the trouble in the shortest possible time.

The above shows what can be done with just a basic log record in blank book form. We hope that each telephone man who has been reading these articles and whose company does not now have a satisfactory system of trouble records will be able to set up at least a basic Trouble Log without delay. Additional records can be added as they are found to be necessary or useful.

(To be continued)

V V

"On the average, only 10 per cent of the nation's forest fires are started by lightning and other natural causes. Most of them are caused by burning cigarettes. The rest are started by smoldering camp fires." — Greenville (Tex.) Evening Banner

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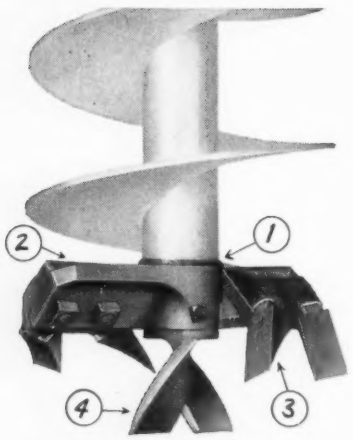

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Cable Testing Techniques

(Concluded from page 29)

Tapping in Locating Moisture Fault

A very simple method for locating high resistance faults is illustrated by *Fig. 5*, where a radio battery and receiver are connected in series with one of the faulty pairs, as a short, or two wires of a cross. Then, while one person listens with the receiver, another taps the cable in the suspected area with a wooden tool, at intervals of about two feet along the cable. When the moisture spot is approached within several feet, the tapping will be heard, increasing in volume until the exact spot has been reached, then diminishing as the distance of tapping beyond the fault is increased.

This method may also be used for determining the exact fault location in a terminal stub when tests indicate that only the pairs in a particular stub are affected, and the cause of the trouble cannot be detected by visual inspection.

Connecting the battery and receiver in series with a faulty pair at the terminal of the suspected stub, and tapping the stub cable, will usually prove effective in locating the point where moisture entered the cable.

We believe that modern cable testing techniques, as applied to the very small plant, should be implemented with these essential instruments, the multimeter (ohmmeter) for analyzing the fault, and a tone and exploring coil for running down faults for which it is best suited, and last but not least, an ordinary 45-volt radio battery and receiver.

With the three above mentioned, simple, inexpensive, pieces of equipment, just about any case of cable failure, except opens, may be corrected in the very small cable plant.

Tapping in Locating Moisture In Textile Cables

The battery, receiver, and tapping method is also efficient for locating slight moisture faults in central office textile-insulated cables, where frequently cross talk is the only manifestation of moisture trouble.

The battery and receiver may be connected to one wire of each of the pairs on which cross-talk is heard, and the cable tapped with a hammer handle or other tool; the faulty spot will be indicated by the sound of the tapping heard in the receiver, the same as on lead-sheath cables.

Small Cable Plant

All the equipment and technique suggested for the very small plant are applicable to the plant comprising numerous aerial cables of various sizes.

In addition, we would recommend the following additional equipment.

The Dynamometer

While testing the stringing tension of messenger strand is not really a cable testing function, it is, however, most important in determining the life of the cable.

The purchase of a modern dynamometer is a good investment, if used intelligently while stringing messenger strand.

Tables covering the strand pulling tensions of various size strand and weight of cables, together with the span lengths involved, are readily available.

This is the only manner by which the proper sag of the cable may be predetermined and a good job assured in advance.

Identification Tones

Modern cable testing technique should include efficient pair identification tones and pick up sets.

Fig. 6A illustrates a tone designed to operate from the 24 or 48-volt central office battery, and is intended for identifying dead pairs.

This tone buzzer only operates while a receiver is connected from the pair to ground, or if the pair happens to be grounded.

When the tone is connected to a clear pair because it is silent until the pair is grounded through the receiver, it does not cause continuous tone noise on other pairs, and at most is heard only when the pair is actually being grounded through the test receiver.

Furthermore, by tapping a prearranged code, personnel in the central office may be signaled to meet the tester who has identified the pair or pairs at a distant splice or terminal.

A group of pairs may be bunched and the tone connected to the bunch after the pairs have been identified as a group in the cable or terminal. The central office may again be signaled by tapping a code.

The individual pairs may then be identified between the central office and the test point by connecting the tone, first to pair number one, then when the tester has identified the pair he taps a code. The central office attendant moves the tone to pair number two, and so on until all pairs have been tested without the use of a talking circuit.

Fig. 6B shows a conventional bat-

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DO a faster, *better* job with a scientifically-designed PENGO Auger—the twin-helix auger that bores clean, true holes in any kind of soil, most sandstones, hardpan, decomposed rock, frozen ground—and even in permafrost. Saves power, cuts maintenance to a minimum! 15 sizes; to fit any earth boring machine.

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tery and buzzer tone circuit suited for identifying working or dead pairs in exchange cables, and may be picked up in splices or terminals using a receiver. A condenser in series with the receiver, prevents unnecessary interruption of working circuits. Where identifying pairs in carrier or voice frequency toll cables, a 500-cycle frequency vacuum tube oscillator with a seven-cycle warble tone, should be used to prevent interference on important toll circuits.

This tone may also be used for pair identification in exchange cables.

Electronic Tone Identification

The electronic device *(Fig. 7)*, provides a quick means for tone identification of pairs in large or small cables of any type.

The tone is heard when the tip of the probe is placed close to the pair, no actual contact with the wire is made with the probe. It is especially useful when pairs must be identified in large cables, but it is also very desirable for work in small cables because it reduces the time required over older methods as well as eliminating the damage to the paper or other insulation caused by a needle probe.

In addition to identifying tones, pairs carrying ringing current to PBX switchboards may be identified by listening to the continuous flow of AC current.

It is also possible to check for busy circuits by listening for the conversation on the line without making actual contact with the wire, and thereby interrupting the service.

Two exploring coils and receivers of different design are shown in *Fig. 8*; also the same units together with amplifiers.

The same amplifier used for pair identification may be used for increasing tone volume in the receiver when locating faults where the tone picked up by the exploring coil is weak, or where extraneous noises interfere with the hearing of the tone.

A tone, together with the exploring coil and receiver, jointed rod, and amplifier, make up a very desirable combination for locating certain aerial cable faults.

It is frequently desirable to determine the exact location of underground structures such as cables, water or gas pipes, sewers, etc., during construction operations.

Connecting one terminal of the tone to an exposed portion of the cable or pipe and grounding the other terminal of the tone, then listening with the exploring coil receiver and amplifier, as illustrated by *Fig. 9*, the cable, buried wire, or pipe, may be definitely located.

Terracotta sewer pipes may be located by placing a steel fish tape in the pipe, and proceeding the same as with metal pipe. The length of terracotta pipe that can be located depends upon how far the tape can be pushed into the pipe.

When no amplifier is available, the home made pick up coil, *Fig. 11*, approximately 24 inches by 24 inches, with 150 turns of bell wire, will be found to be efficient for locating buried wires, cables, etc.

(To Be Continued)

V V

Add Mississippi to Association Name at Alabama Convention

At the recent convention of Alabama Independent Telephone Association in Montgomery, it was voted to change the name to Alabama-Mississippi Independent Telephone Association, because for three years the Independents of Mississippi have had the right to be members of the Alabama association and because of the small number of Independents in Mississippi, which would make it difficult to form an active, going association there.

A recent newsletter of the association said further that the Alabama association had felt "that it would be valuable to the Mississippi companies to have some state association which they could call their own. Accordingly, a tentative step was taken in this direction in 1949, and, the move being approved by the active Mississippi companies, the final step of making this a two-state association was completed this year."

V V

Kentucky Company Reorganized Into Nonfunctional Setup

Ashland Home Telephone Co., Lexington, Ky., recently changed its organization set-up from functional to nonfunctional operation.

Marston V. Shepherd, formerly area commercial manager at Ashland, has been appointed district manager, and will direct the operating departments in the northeastern territory.

Paul S. Payne, formerly district plant superintendent at Lancaster, was appointed district manager at Lancaster and will be in charge of the operating departments for the central and southeastern territory.

The Ashland district comprises 12 exchanges with more than 11,000 stations; the Lancaster district includes 6 exchanges with approximately 2,500 stations.

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With the Doubl
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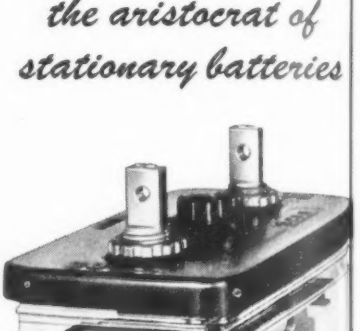

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Communications Developments

(Continued from page 34)

The SAMM system is an economical and convenient method of giving metered service without the use of meters and the attendant manual operations required to read the meters, compute the number of calls made, and compute the bills.

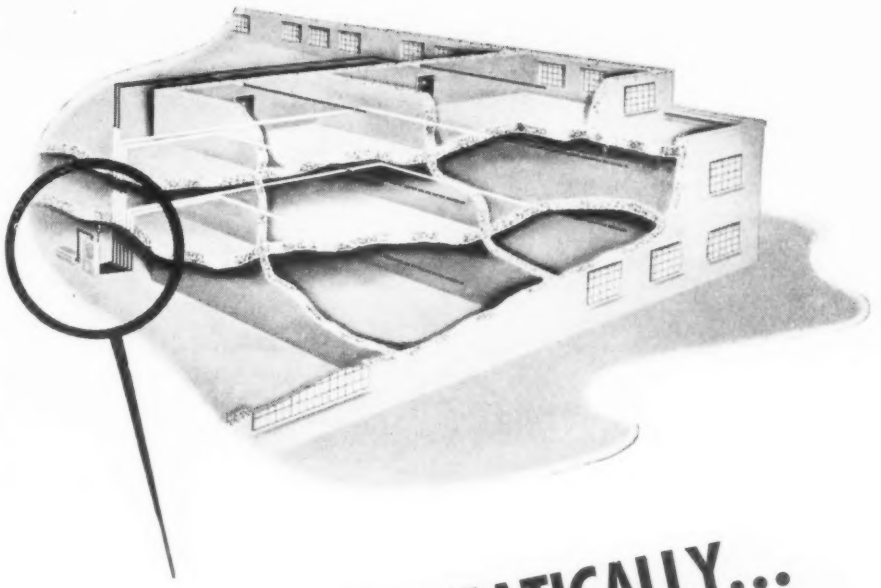
3. Materials

3.01. *Coaxial Cable for High Frequency Transmission.* Tests are presently being made on coaxial cable of a new German design. These tests to date indicate that this cable has certain advantages for high frequency transmission and arrangements are being made to start its manufacture in this country.

The inner conductor of this new cable consists of a solid copper wire for the smaller sizes and a copper tube for the larger sizes. This conductor is coaxially supported in an aluminum tube by means of a polystyrene foil helix. The polystyrene foil helix gives the cable a highly homogeneous insulation with a minimum amount of insulating material. The stability of the helix is such that even in case of the smallest bending radius of the cable, the spacing between the inner and outer conductors is still strictly observed, and the inner conductor also retains its concentric position in relation to the outer conductor in case of greater temperature differential.

The seamless aluminum sheath was selected as it has not been possible so far to apply copper tubes to cables of this type in long lengths without joints. Aluminum was also selected because the percentage share of the outer conductor in the total losses of the cable is comparatively small and, consequently, the difference in conductivity of copper and aluminum at high frequencies need not be considered. In addition, the aluminum sheath, if rigid enough, permits a sufficient change of form required to wind the cable in comparatively long lengths on normal sized reels for shipment. The aluminum sheath was also selected in preference to lead because it is lighter and has no tendency to crack or crystallize from vibration when installed on antenna masts or towers.

3.02. *Q-Floor Wiring.* Q-Floor construction utilizes steel beams which combine the inherent qualities of steel, light weight and great strength. These cellular steel units are laid onto and welded to the steel framework of the building, but can also be supported by



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The first whiff of smoke sets off an alarm, based on an exclusive operating principle . . . no chance of smoke, smoldering or fire spreading . . . instantly, the air conditioning shuts down, doors and dampers close, operating equipment stops and fire extinguishing systems actuate . . . a truly automatic fire watchman.

Four types of smoke detectors and several different installation arrangements are available to fit your particular needs...single space systems, double space systems, multiple space systems, air conditioning duct systems . . . all function by drawing continuous air samples through simple piping to a smoke detector.

Actual fire tests made by the Underwriters' Laboratories, Inc. show that fire detection with this type of smoke detecting equipment is much quicker than other methods . . . because usually there is smoke or smoldering before flames break out.

Remember fire doesn't wait . . . so, with current expensive delayed replacements, why not let an expert C-O-TWO Fire Protection Engineer help you now in planning economical, fully approved fire protection facilities. Write today for complete free information.

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MANUFACTURERS OF APPROVED FIRE PROTECTION EQUIPMENT

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other types of construction. They are the structural sub-floor.

In addition, the cells of the units function as a super efficient series of electrical raceways on six-inch centers which, when fed by the proper fittings, provide complete communication and electrical availability. The combination of the cellular steel beams, floor fill, and fireproofing is called Q-Floor because it is quick-in structurally and permits quick-change electrically.

There are three fundamental rolled steel shapes that make up the cellular steel beams. They are welded together in various combinations to form five types of units. The units are manufactured in lengths up to 25 feet. The standard width of each unit (four cells wide) is two feet except when fabricated in two cell or 12-inch widths. These widths permit the adaption of the units to the two-foot module of design favored by many prominent architects and also conform to the standard modular system. The steel used in the manufacture of the cellular steel beams is light gauge, structural quality, flat, hot rolled carbon steel.

The Q-Floor method of electrical distribution insures neatness and economy. The method involves, basically, the cellular steel beam, which is the structural load-carrying element, and a complementary system of crossover headers, or cell feeders. The headers permit the drawing of wires from a panel box or cable terminal to any of the cells in the floor area. Each type of service requires a separate crossover header feeding its particular cells. If two services are used, as telephone and power, every other cell is fed by each header; if three services are required, as telephone, a signal system and power, every third cell, and so on. This method provides overall floor service for as many systems of wiring distribution as desired.

A floor outlet can be placed at any point on the floor's exposed surface over any cell available for the service desired. Installation of a telephone, signal, or power type of outlet may be made at any point. Miscellaneous wall outlets may also be fed from the floor.

Modern practice daily demonstrates the need for installing electrical outlets practically anywhere in the floor area at any time. Movable demountable partitions and electrical equipment create frequent floor layout changes requiring large numbers of electrical outlets. Q-Floor construction insures against a building's stagnation and obsolescence.

(To be concluded next week)

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Courts and Commissions

Oklahoma Judge Rules Against Dial Attachments in 5 States

Stephen S. Chandler, U. S. district judge at Oklahoma City, Okla., has ruled that an attachment distributed by Dialite Dial Co., Houston, Tex., cannot be placed on telephone dials in Oklahoma and five other states.

Southwestern Bell Telephone Co., which brought the action, claimed that installation of the "gadgets" was depriving the company of using the centerpiece on the dial, and that the instrument often was damaged while installations were being made.

In the meantime Dialite has brought a counter suit against Southwestern Bell, charging it with violating the Sherman Antitrust Act.

V V

Nebraska Commission Dismisses Territory Invasion Complaint

By a vote of 2 to 1 Nebraska Railway Commission dismissed the complaint of Elmer J. Chrisp, owner and operator of Madrid-Elsie Telephone Co. against Elsie Mutual Telephone Co.

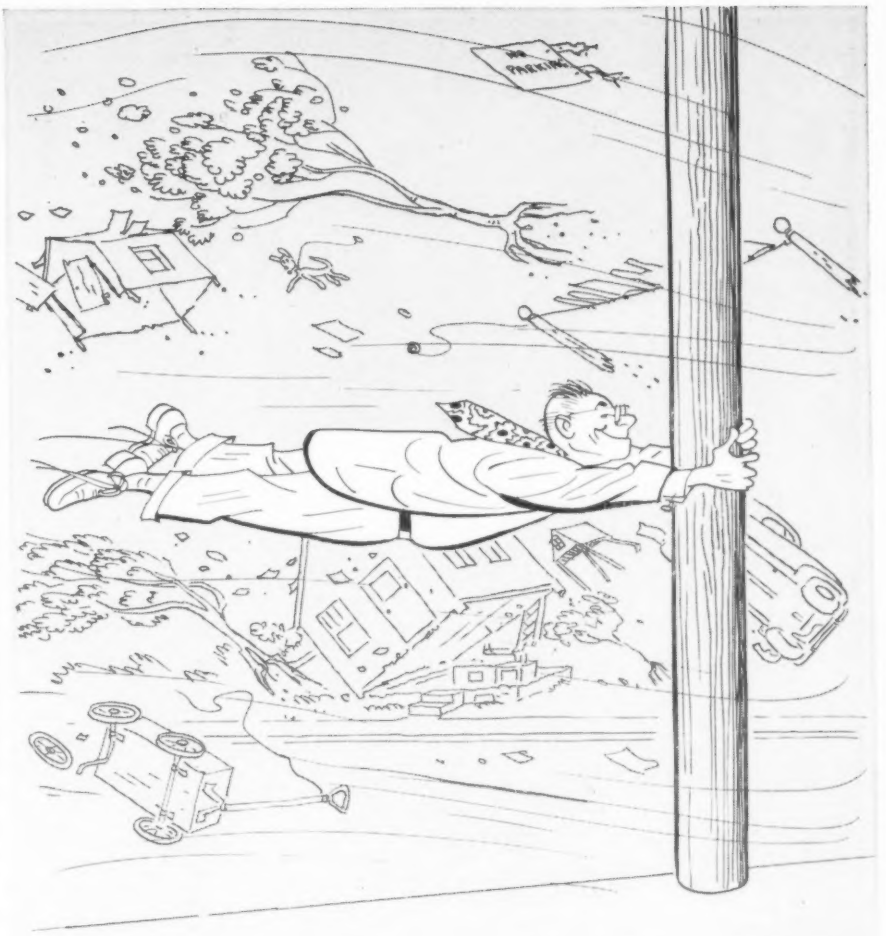
The latter corporation, recently organized by farmers in Perkins County to provide improved service, was charged by Chrisp with invading his territory in violation of the new law limiting new construction to public conveniences and necessity.

V V

Nebraska Commission Rules It Has Jurisdiction Over Mutuals

Nebraska Railway Commission has ruled that, under the provisions of an act passed by the state legislature at its last session, its jurisdiction was extended to cover mutual companies where there is any controversy between companies arising out of efforts to extend their facilities into territory claimed by existing companies.

The ruling was made in the case brought before the commission by Elmer J. Chrisp, owner of Madrid-Elsie Telephone Co., against Elsie Mutual Telephone Co. (See above story.) The decision stated that, although the Elsie company did not complete its construction or start giving service until after the law became effective last March, this fact was immaterial because the company had been conceived, organized, developed and partially constructed before that date. In addition the delays



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Linemen know that Koppers Poles are strong. And they have good reason to know that Koppers Poles *retain* their strength . . . this means much less maintenance work for them . . . fewer poles to replace.

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that followed were not of the new company's doings.

Telephone mutuals are not under the jurisdiction of the commission to the extent that common carrier corporations are, and the attorney for the Elsie company challenged the right of the commission to hear the complaint.

On this the commission said: "The constitutional powers of the commission may be extended and protected by legislation bestowing broader jurisdiction, a ruling reflected in many statutes bestowing non-common carrier jurisdiction on the commission and by decisions of our supreme court on the subject. Moreover the right of the legislature to require certificates of convenience and necessity is not subject to constitutional attack."

Without jurisdiction over all telephone companies, the act, which seeks to prevent duplication of telephone facilities, would be ineffective in all cases.

V V

Northwestern Bell Seeks Increases in Four States

Nebraska Railway Commission has set for further hearing Dec. 12 the application of Northwestern Bell Telephone Co. for an order fixing just and reasonable rates. (TELEPHONY, Oct. 6, p. 28) The request was filed on June 11, and a full and uncontested hearings was held, but later the commission asked for further information.

Northwestern Bell has been earning less than the 7.5 per cent that it insists is necessary to secure capital in a competitive loan market.

None of the state regulatory bodies in Minnesota and the Dakotas has taken final action either, part of the delay being because of demands for further data. Iowa on the other hand, has no such body, and repricing went into effect there months ago.

The Minnesota application was filed early in April, and two hearings have been held, the last in mid-November.

Applications filed in the Dakotas have been pending since mid-December of 1950. Hearings have been held in both states, but the commissions still ask additional facts and figures.

V V

West Coast (Wash.) Company Asks $474,188 Increase

Increased rates for subscribers to service of West Coast Telephone Co., Everett, Wash., and its subsidiary, Telephone Service Co., have been asked of Washington Public Service Commission.

The companies' request was made at a hearing before the commission in Everett the week of Nov. 19. Increased operating costs and the need for expansion of service because of popula-

tion growth were cited as the reasons for the request.

Ray Dalton, vice president and general manager for the West Coast company, testified that at the time of the previous general rate increase obtained by the company in 1946, it was estimated that 5 million dollars would be needed in the ensuing five years to care for expansion. In the five years, however, the company has spent more than 9 million dollars, he said.

The over-all increase sought for both companies would bring in an estimated additional $474,188 annually, company witnesses testified, amounting to about a 7½ per cent increase for the West Coast portion of the system. Some $33,-103 of the total estimated annual income would be obtained from the Telephone Service Co.'s subscribers.

About $209,000 of the total sought would result from increased toll charges for calls between points within the West Coast system, and the remainder from increased exchange rates and miscellaneous items.

The new rates sought would raise rates for most subscribers, although a few rates would remain unchanged or be reduced, and would increase the charge for calls from paystations from five cents to ten cents.

V V

Rules Against Transferring Of Certificates of Necessity

A certificate of convenience and necessity of whatever character granted and issued by Nebraska Railway Commission is no property within the meaning of the state statutes, and the commission has no jurisdiction to transfer or assign it from one holder to another.

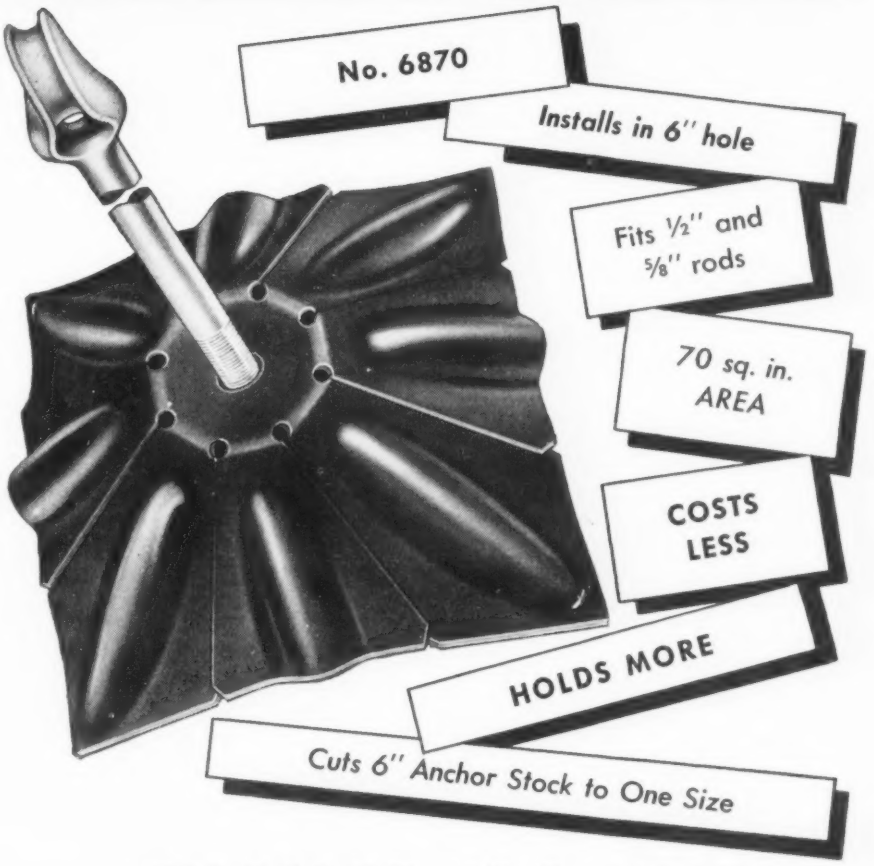
That is what the state supreme court said recently in sustaining the appeal of Union Pacific Railway Co. from such an order involving two motor transportation companies. The court said that such a certificate is a mere license than can be revoked or amended at will of the issuing body, and that being the case, it is personal in character, and no property right is vested in it and it is not transferable, even though this was a case in which consolidations were being made.

V V

Pacific T&T Victim of Directory Infringement

In a recent case involving Pacific Telephone & Telegraph Co. v. Independent Directory Corp., a decision was rendered by District Court, Southern District of California, on the subject of directory infringement. The court found for Pacific T&T because the Independent company had clipped advertisements and listings from the Pacific

Here's the ANCHOR for Rural Telephone Lines



CHANCE 6" 8-WAY EXPANDING ANCHOR

You can stock this six-inch 8-Way Expanding Anchor for most rural telephone line guying—save on initial costs—on installation time—and save stocking two sizes (it's designed to replace the Chance No. 62 & 64).

The 6870 has a 70 square inch area and a rated soil-anchor holding strength of 14,000 pounds in class 4 soil (crumbly damp).

This anchor has all the fine features of the famous Chance eight-inch 8-Way. It is "streamlined" to expand quickly—no bolts to cut—holding wires shear with a single blow of the expanding bar. There is no wasted area between blades and the weight of the load is carried by eight blades instead of two or four . . . All good reasons why the Chance 8-Way is on the specs of the biggest anchor users in the telephone industry—reasons why you should specify Chance six-inch 8-Way on *your* next order.

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Now your regular telephone service truck can be put to the added use of pole setting. Normally it will take two men less than ten minutes to set up the derrick, attach the digger, dig the hole and set the pole—all ready for tamping. It's all accomplished with the Model 325 Derrick and Digger Attachment, made to fit all service trucks as illustrated.

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★ **Sets poles up to 35'; takes augers 8" to 20" diameter**

★ **Packaged unit for installation by your local mechanic**

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company's telephone directories and used these clippings in soliciting advertising for the Independent Directory.

The court held that mail order solicitation forms, used by the defendant (the Independent Directory Corp.) and an individual to solicit advertising for their directory was an infringement of the telephone company's classified directories where the defendant affixed to such forms advertisements and listings cut from the telephone directories and also where defendants copied classification headings from the directories.

The Independent Directory Corp.'s acts also were held to constitute unfair competition. The court enjoined the defendants, their officers, agents, employes and all corporations controlled by them from conducting their business so as to lead persons or corporations to believe that they are ordering advertising in directories of the telephone company.

Defendants were ordered also to deliver for destruction all copies in their possession of infringing order forms, certain issues of their directories, and all plates, moulds and other materials for making infringing copies of Pacific T&T's directories.

The court also ordered Independent Directory Corp. to pay Pacific T&T $2,000 for infringement of plaintiff's copyrights and attorneys' fees of $5,000.

V V

Commission Acts to Cancel Indiana Bell Increase

In opposing an Indiana Bell Telephone Co. appeal over one of its rate decisions, Indiana Public Service Commission on Nov. 21 made a legal move aimed at throwing out entirely a $5,400,000 temporary rate increase authorized by Marion Circuit Court. (TELEPHONY, Oct. 13, p. 23)

The commission apparently set the stage for another legal controversy in the long drawn out case by an action which it contends will force Judge Lloyd D. Claycombe of the circuit court to dismiss the company's appeal outright.

The commission acted only 48 hours after Judge Claycombe authorized it to consider any change in its contested rate order. The commission took the following action:

(1) Cancelled out its Sept. 5, 1950, rate order—the one on which the company has based its appeal.

(2) Scheduled its own hearing on new evidence, to have been held on Nov. 30.

(3) Pointedly referred to a 1929 state law which, it contends, mandates a judge to dismiss an appeal when a rate order is rescinded.

Harry S. Hanna, Indiana Bell president, responded by stating that the utility will resist the commission action. Judge Claycombe indicated he would not act until December. An order of his own court, the judge stated, has "stayed all proceedings" in the case until then.

President Hanna did not question commission's right to cancel its own orders, but he declared:

"It is difficult to understand how the commission expects to dispose of our appeal, from an order which we have shown to be grossly inadequate, by rescinding that order and thereby allowing us nothing at all."

Although Judge Claycombe authorized the billing of the $5,400,000 in temporary rate increases last July 1 by issuing an injunction against the commission, he placed the case back in the hands of the commission temporarily on Nov. 19.

Under Judge Claycombe's proposition, the commission would examine new evidence presented before him but not heard by the commission. Then, it was explained, the commission would have an opportunity to amend its old order and recognize the company's increased revenue needs resulting from higher wages, taxes and other items.

Commission Counsel Walter F. Jones Jr. pointed out mandatory provisions of the 1929 law which concerns rate appeals. It states, "If the commission shall so report that it has rescinded its order, the court shall thereupon dismiss this action."

All three commissioners concurred in the action of Nov. 21. They are Hugh W. Abbett, Wendell Tennis and Crawford F. Parker.

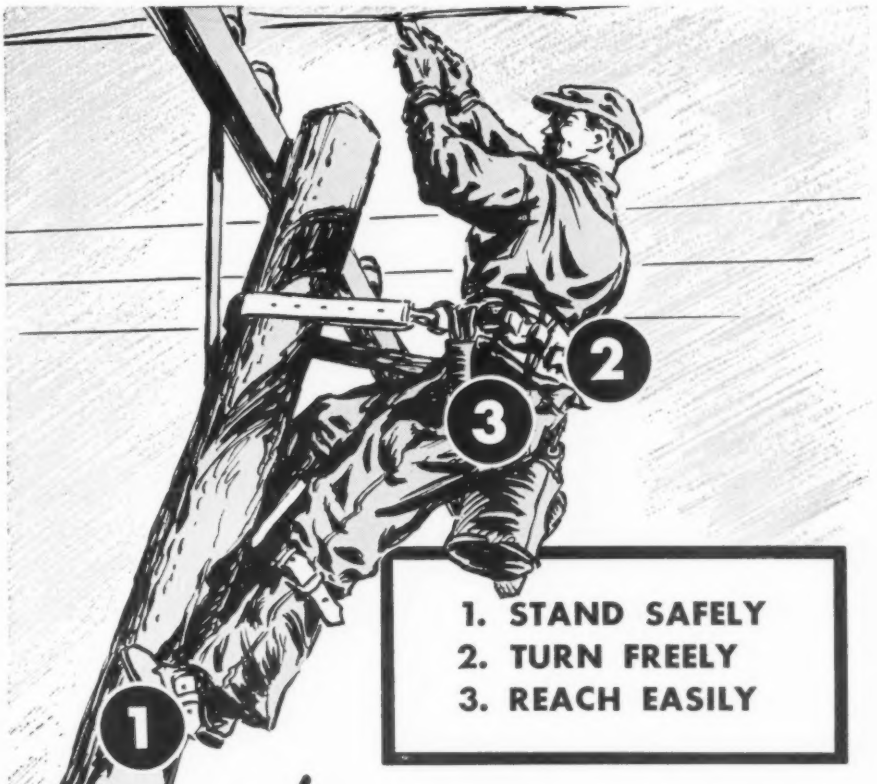
Last September, the company asked Judge Claycombe to authorize $10,100,000 in annual rate increases on a permanent basis which would include the $5,400,000 temporary rate boost of last July 1. The commission's Sept. 5 rate order authorized an annual increase of only $730,000.

V V

Oklahoma Independent to Sell or Close Exchange

Ninnekah (Okla.) Telephone Co. was given 30 days in which to sell its exchange and, if it cannot find a buyer, it will be permitted by Oklahoma Corporation Commission to close and abandon service. The company has a tentative offer of $3,000 for the property (TELEPHONY, Aug. 11, p. 26).

Its present owner, J. B. Carel, told the commission at a hearing recently that he has been losing money for several years and cannot find capital with which to continue the service.



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2. TURN FREELY
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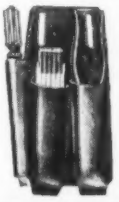

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Maintenance Testing

(Continued from page 37)

relay winding is regulated equally by the current flowing in amperes and the number of turns of wire in the winding, called the ampere-turns (IT), required to obtain the necessary magetizing power.

Since the magnetizing power of a relay winding is proportional to the ampere-turns, the operating voltage, the current available for energizing the relay winding, and the arrangement of the external circuit usually prescribes the number of turns of wire required in the winding. However, principal factor involved is the amount of current flowing because this determines the number of lines of magnetic force around each wire, and, of course, the total number of turns then determines the number of lines of force which will be produced.

There is a law which governs the amount of magnetism produced by any particular number of ampere-turns.

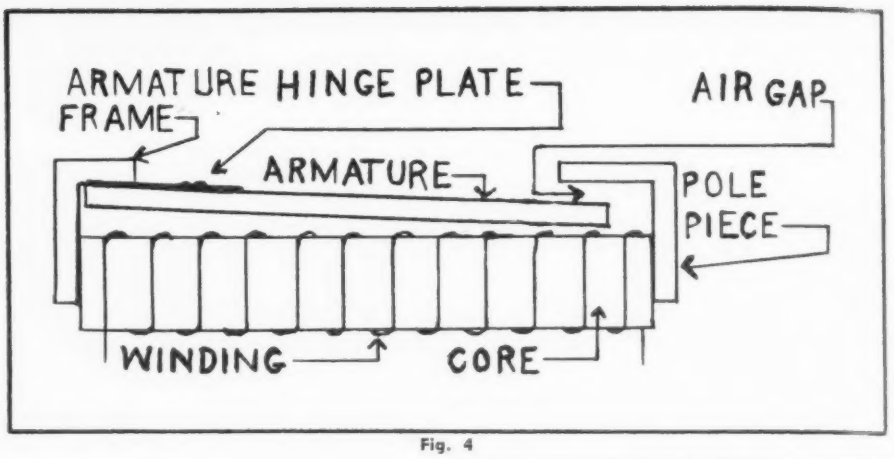


Fig. 4

In substance, the "easier" it is to set up lines of force the fewer ampere-turns will be required; or, vice versa, the harder it is to set up lines of force, the larger the number of ampere-turns will be required.

For example, a magnetic field of the same strength may be obtained by winding a relay coil either with a large number of turns of fine insulated wire through which only small current values are available to produce an appreciable amount of magnetism, or by winding with a few turns of larger wire and using a correspondingly larger current. In any event, in order to have

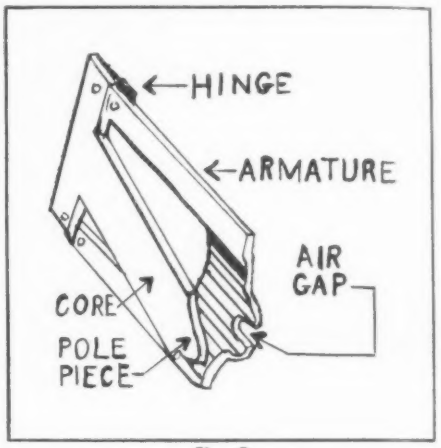
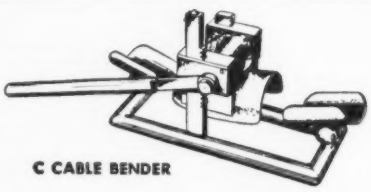
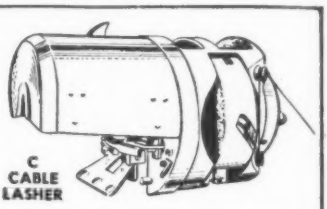


Fig. 5


C CABLE BENDER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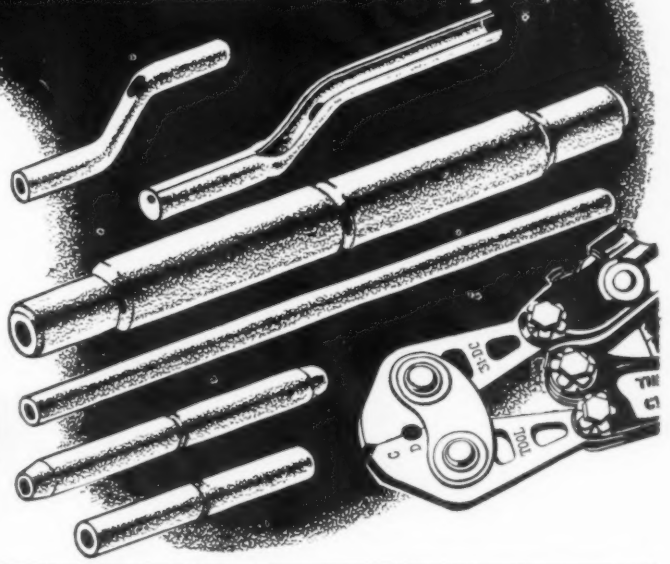

Nicopress Sleeves and Taps give you *permanently* quiet connections! They clamp tightly onto the conductors—insure rigid, sealed electrical contacts. No dirt can enter. No corrosion can form, to cause high resistance joints. Eliminate noisy connections with Nicopress Sleeves and Taps *today!*

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satisfactory results, a necessary amount of ampere-turns is required.

The ampere-turn is defined as a single turn of wire through which one ampere is flowing; is a measure of the magnetomotive force produced and is equal to the product of the current and number of turns; or MMF=IT. Example: 0.1 ampere flowing through 900 turns of wire produces a MMF of 0.1x900=90 ampere-turns. The same force could be produced by two amperes and 45 turns, or by 90 amperes and one turn, etc., the product of the turns and current in each case being 90.

Although it is a general principle that a certain amount of ampere-turns produce a certain number of magnetic lines of force, it should be kept in mind that any certain number of ampere-turns will not always produce the same number of magnetic lines of force, any more than a certain EMF will always set in motion the same amount of electrons.

(To be continued)

V V

>> There are 27 million miles of wire in the nationwide long distance telephone network.

OBITUARY

LEROY WITTEMIRE, 74, director and general manager of Mansfield (O.) Telephone Co., died at Mansfield General Hospital on Nov. 26, following a heart attack.

Mr. Wittemire was born in Perrysville, O., on Sept. 29, 1877. He was graduated from Perrysville High School and Mansfield Business College.

He began working at Mansfield Telephone Co. in June, 1902, and would have completed 50 years of service next year.

Surviving are his widow, Mary A.; a son, LeRoy Jr.; a daughter, Mrs. W. E. Renwick, and a grandchild, Roger Renwick.

V V

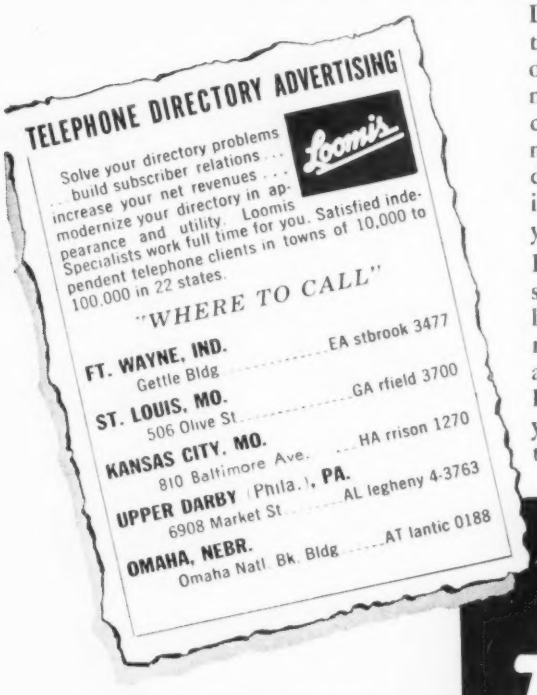
Mrs. John H. Agee Dies

Bertha H. Agee, 67, wife of John Agee, former vice president and general manager of Iincoln (Neb.) Telephone & Telegraph Co., died at her home in Lincoln on Nov. 24 after a brief illness. She was prominent in civic and church activities in Lincoln. Mr. Agnee, now retired, was a former director and president of the United States Independent Telephone Association. Other survivors include two sons and three sisters.

Why Directory Advertising?

USE THESE TESTED POINTS TO PRODUCE MORE PROFITS FOR YOU . . .

10. ADVERTISING INSURANCE. "In the book" has come to mean in business. Rather than competing with other media, your telephone directory offers advertising that insures the effectiveness of all advertising on the local plane . . . for only a few cents a day.


TELEPHONE DIRECTORY ADVERTISING
Loomis
Solve your directory problems . . . build subscriber relations . . . increase your net revenues . . . modernize your directory in appearance and utility. Loomis Specialists work full time for you. Satisfied independent telephone clients in towns of 10,000 to 100,000 in 22 states.
"WHERE TO CALL"
FT. WAYNE, IND. Gettle Bldg. EA stbrook 3477
ST. LOUIS, MO. 506 Olive St. GA rfield 3700
KANSAS CITY, MO. 810 Baltimore Ave. HA rrison 1270
UPPER DARBY (Phila.), PA. 6908 Market St. AL legheny 4-3763
OMAHA, NEBR. Omaha Natl. Bk. Bldg. AT lantic 0188

Do you let telephone directory advertising sell itself . . . or are you using this recognized service to build increased net revenue? The more space you sell in your directory, the more useful it is as a buying guide for all your subscribers.

Loomis provides a complete service for building better looking and more useful directories with more complete advertising representation. For further facts, we invite you to call or write Loomis today.

● More than 300 Loomis-built telephone directories now are serving 650 cities and towns. Loomis clients report continued increases in net revenue every year.

Loomis
ADVERTISING COMPANY

In the Nation's Capital

(Concluded from page 19)

the necessity of waiting *more* time for its higher rates. During that time the higher tax expense (and other expenses as well) go merrily on. The company has no way to recoup the money it must lay out for them, even though it eventually succeeds in convincing the commission that it needs more money and obtains an order granting higher rates.

This writer has no practical suggestion for protecting utility companies from such inequitable "chiseling" in favor of the rate-payer. If there were some way to make rate increases go into effect *immediately*, under proper bond, the public would be sufficiently protected. But the reverse can never be true. Money once spent by a utility on current operations is gone for good. It cannot be charged against subsequent operations.

V V

>> Radio telephones operated by wind-charged auto batteries have been installed at every sheep station in the Falkland Islands, 500 miles northeast of Cape Horn.

It isn't news that we have the crews

to do
Telephone Work
Inside
Outside
Underground
or
Aerial
and
in
addition
we can
engineer and install
Central Office
Equipment
of
Any and Every
Kind —

If you want us
or
need us —
Call Kingswood 0611
or
L. D. 78

GUSTAV HIRSCH ORGANIZATION, INC.

1347 West Fifth Ave.
Columbus 12, Ohio

Lasting service in every reel!

KENNECOTT CABLE

Every reel of Kennecott Telephone Cable meets the highest manufacturing standards . . . to insure uniformity, dependability and lasting service. Whenever you need telephone cable specify Kennecott.

Information about Kennecott Cable can be obtained from any of the Chase Offices listed below.

Chase Brass & Copper Co. is an affiliate company of Kennecott Wire and Cable, with 27 sales offices (23 of them warehouses) in leading industrial centers from coast to coast.

CHASE 75th ANNIVERSARY 1876 - 1951

CHASE BRASS & COPPER CO.
—INCORPORATED—
WATERBURY 20, CONN. • DISTRIBUTOR FOR

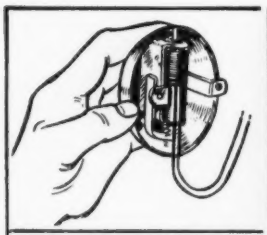
KENNECOTT WIRE & CABLE CO.

SUBSIDIARIES OF KENNECOTT COPPER CORPORATION

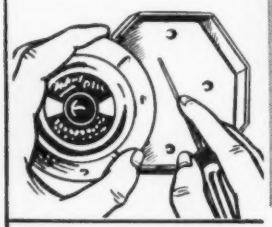
ALBANY† ATLANTA BALTIMORE BOSTON CHICAGO CINCINNATI CLEVELAND DALLAS DENVER† DETROIT HOUSTON† INDIANAPOLIS KANSAS CITY, MO. LOS ANGELES

MILWAUKEE MINNEAPOLIS NEWARK NEW ORLEANS NEW YORK PHILADELPHIA PITTSBURGH PROVIDENCE ROCHESTER† ST. LOUIS SAN FRANCISCO SEATTLE WATERBURY

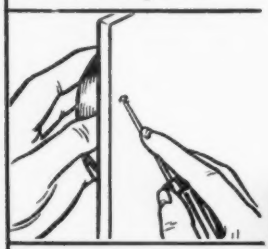
†Indicates Sales Office Only



Open back models designed for simple bracket mounting on strap or chassis.



Enclosed back with adapter plate suitable for direct mounting on a 4" round or octagonal box.



Enclosed back with terminal block for screw connections.

NEW

MIDGET BELLS

SMALL SIZE... LOUD RINGING

By the ORIGINATORS of UNDERDOME Bells

"Slow stroke" action plus prolonged vibration of bell shell results in a greater sound carrying power and clear, distinctive tone greatly superior to the buzzer-like action of ordinary bells. Only one moving part (the plunger) minimizes wear. Polarized . . . no contacts to spark, arc, stick or wear. 2½" or 3" diameters, for operation on standard A.C. voltages; with adapter plate for mounting on standard outlet boxes. Also available in a variety of mounting arrangements and finishes for use as components on original equipment. Write for literature MB7.

Sold through Electrical Wholesalers

Wheelock SIGNALS

SIGNAL

ENGINEERING & MFG. CO.

154 WEST 14TH ST. NEW YORK 11, N.Y.

LINEN LACING TWINE

Solve Your Lacing Twine Problems

USE

Armature Brand

Manufactured to Meet Your Requirements

EDERER, INC.

PHILADELPHIA 24, PA.

H. S. Clark & Son, Chicago 6 — F. J. Fawcett Inc., Boston 11 — Hayne-Surridge Co., St. Louis 3 — H. H. Kemper Co., Cincinnati 2

AT&T to Construct TV Link to Canada

Authority to build the United States end of the first international television link between Buffalo, N. Y., and Toronto, Can., was granted on Nov. 7 to the Long Lines Department of American Telephone & Telegraph Co. by the Federal Communications Commission. Antennas will be added to the Bell System's microwave station at Buffalo to beam United States network programs across the border to a Toronto-Montreal radio-relay system now under construction by Bell Telephone Co. of Canada.

According to present plans, the Buffalo transmitters would relay TV programs 23 miles northwest to a microwave station at Fonthill, Ont. From there programs would be beamed 41 miles across the western tip of Lake Ontario to Toronto.

Start of service on the Buffalo-Toronto TV link is scheduled for 1952, to coincide with the opening of Toronto's first television broadcasting station. Following construction of 12 more microwave stations along a proposed route east of Toronto, Montreal will be added to the Canadian TV network in 1953. Bell Telephone Co. of Canada has been awarded a five-year contract by Canadian Broadcasting Corp. to provide a TV channel linking Buffalo to Toronto and Montreal.

V V

Begin Long Distance Dialing From Texas; Fifteenth City

Telephone operators in Dallas, Tex., in November began to dial directly to telephones in distant cities through new automatic switching equipment placed in operation by the Long Lines department of American Telephone & Telegraph Co. and Southwestern Bell Telephone Co. Dallas became the country's fifteenth city with machine switching equipment for handling long distance calls.

Besides permitting direct long distance dialing to more than 1,200 communities by telephone operators in Dallas, the equipment automatically switches calls that are routed to and through Dallas from other cities. The 6 million dollar system, installed over a period of 10 months, will handle approximately 25 per cent of the long distance traffic originating, terminating, or switched at Dallas. About 110,000 long distance calls pass through the Dallas central office daily. The project is part of a Bell System expansion and improvement program which will make possible faster and more accurate handling of long distance calls throughout the United States.

LOWELL

IS A LEADING MANUFACTURER

of Top Quality Telephone Wires for Telephone people who appreciate that lasting installations reduce cost.

Neoprene Jacketed Drop Wire for the toughest assignments and highest performance standards, with adhesion capable of withstanding great stress. Premium grade materials and extra care in manufacturing and testing assure the user of drop wire which is highly resistant to compression and abrasion. Write us today for samples, prices and technical data.

LOWELL

- **NEOPRENE**
  JACKETED AND RUBBER INSULATED
- **DROP WIRE**
  WITH BRONZE, COPPERWELD OR COPPER CONDUCTORS, BRASS FLASHED OR TINNED

All Lowell Telephone Wire is thoroughly tested for physical and electrical characteristics in completely equipped, modern laboratory and inspection departments, and manufactured under rigid quality control.

A complete line of Insulated Telephone Wire—outside or inside.

Distributed by: THE TELEPHONE REPAIR & SUPPLY COMPANY, 1760 Lunt Avenue, Chicago 26, Illinois

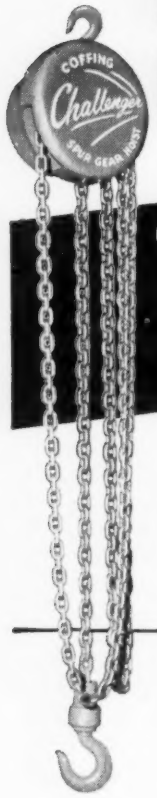
• • • LOWELL

INSULATED WIRE DIVISION

The Overlakes Corporation • LOWELL, MASSACHUSETTS

NEW

Coffing Challenger



What you have been waiting for in a Spur-Gear Hoist

Light Weight

Carry it with one hand. One-ton model, with coil chain for standard lift of 8 ft., weighs only 38 lb.

Ruggedly Dependable

Use it year after year. Long life is built in . . . sealed in. Housing is formed steel plate—will not crack under sudden shock loads. Back plate is laminated for extra rigidity. Hoist mechanism has sealed-in lubricant.

Safe

Trust it to protect men and equipment. Tested at 100 percent overload. All load-holding parts are special alloy steel. This hoist actually has a five-to-one safety factor.

Economical

Service it yourself. The Challenger may be completely disassembled in minutes with simple tools. No lost travel time to and from the factory for repairs.

Find out more about the all-new Coffing Challenger, available in ½- and 1-ton capacities. Write for Bulletin T12C.

COFFING HOIST COMPANY
Danville, Illinois

QUIK-LIFT ELECTRIC HOISTS • HOIST-ALLS • RATCHET LEVER HOISTS • MIGHTY-MIDGET PULLERS • DIFFERENTIAL CHAIN HOISTS • LOAD BINDERS • I-BEAM TROLLEYS

Two Promotions Announced By Lincoln (Neb.) T&T

Two men have received supervisory appointments in the commercial and accounting departments of Lincoln (Neb.) Telephone & Telegraph Co.

Kenneth J. Boshart, formerly traveling auditor, has been named training supervisor on the staff of the general

K. J. BOSHART

commercial superintendent and will have charge of methods surveys and the training of commercial employes in the 122 exchanges served by the company.

Meurice W. Franklin, accountant, succeeds Boshart as traveling auditor

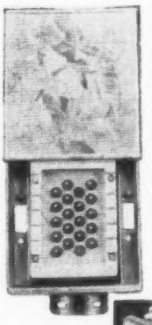
M. W. FRANKLIN

and becomes a member of the general auditor's staff. He will be responsible for auditing the accounts and records of the company's business offices in southeastern Nebraska.

Boshart was first employed in the company's accounting department in 1929 as a plant clerk. He later was a

Aerial Cable Bargains

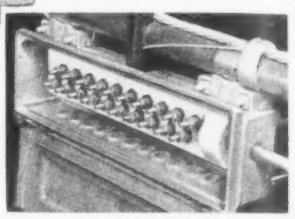
New cable terminals—limited quantity—a fortunate job lot purchase—All Bell System types. Priced to save you money—



Bell Type F 26
(unprotected) for distribution terminal or junction of cable and open lines. Cast iron case with galv. iron slip cover. 26 pairs only—5½ ft. stub terminals—only **$21.49**

Bell Type N 26
(unprotected) Pole mounting type. Alum. alloy housing—snap cover—Porcelain lining—26 pair—5½ ft. stub terminal—only **$24.95**

Ask for Catalog No. 12



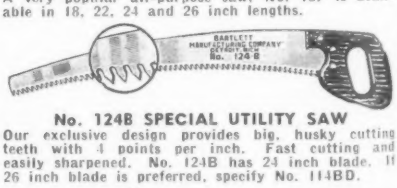
NA 16—(unprotected)—messenger mounting—16 pair—5½ ft. stub terminal—**$14.78**
NE 10—(unprotected)—messenger mounting—11 pair—Gas tight — 5½ ft. stub — only **$12.49**
NE 16—same with 16 pair—only **$15.45**

LINE EQUIPMENT SALES
537 So. Dearborn St. Chicago 5, Ill.

PROPER PRUNING WITH SAWS THAT HAVE PROVEN THEIR WORTH FOR YEARS. NO NEED TO EXPERIMENT WITH NEW AND UNTRIED TOOLS.

Bartlett offers quality saws for immediate delivery.

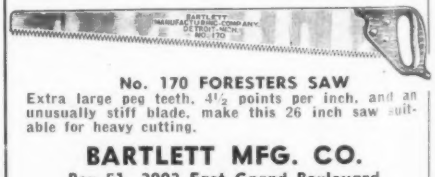
No. 127 PARAGON SAW
A very popular all-purpose saw. No. 127 is available in 18, 22, 24 and 26 inch lengths.



No. 124B SPECIAL UTILITY SAW
Our exclusive design provides big, husky cutting teeth with 4 points per inch. Fast cutting and easily sharpened. No. 124B has 24 inch blade. If 26 inch blade is preferred, specify No. 114BD.

No. 114 RAPID CUT SAW
Similar to No. 124B except that every third tooth is a raker tooth. Gullets are especially deep to provide quick clearance. Also furnished in 24 inch length, known as No. 124 Rapid Cut Saw.

No. 41 TUTTLE TOOTH SAW
This popular saw is made in 20 and 24 inch lengths. Equipped with a special extra large handle. Tuttle Tooth design is excellent for large cuts.



No. 170 FORESTERS SAW
Extra large peg teeth, 4½ points per inch, and an unusually stiff blade, make this 26 inch saw suitable for heavy cutting.

BARTLETT MFG. CO.
Box 51, 3003 East Grand Boulevard
DETROIT 2, MICHIGAN

bookkeeper, distribution clerk and material clerk before joining the Armed Forces in 1942. On his return from the Pacific Theatre of Operations in 1945, he became an advanced clerk and in 1947 was appointed revenue methods supervisor. He advanced to traveling auditor in 1949.

Franklin also joined the company in 1929 as a plant clerk in the accounting department. He became voucher and invoice supervisor in 1935 and in 1949 served for a time as a member of the staff of the United States Independent Telephone Association in Washington, D. C. He returned to the company as an accountant in May, 1949.

Both men are members of the Frank H. Woods chapter of the Independent Telephone Pioneer Association.

V V

Pacific T&T Completes Plans for Stock Sale

Pacific Telephone & Telegraph Co. completed arrangements on Nov. 27 for $63,327,400 of new financing, the proceeds of which will be used to meet demands for additional service throughout the company's west coast system. (TELEPHONY, Sept. 15, p. 32.)

Pacific T&T will issue 633,274 shares of new common stock of $100 par value at $100 a share on a subscription basis to present common and preferred stockholders of record at the close of business on Nov. 27. Rights to the new stock will be issued in the ratio of one new common share for each nine shares of either common or preferred now held. The rights will expire on Dec. 28.

V V

Western Light & Telephone Plans Construction Financing

Western Light & Telephone Co., Kansas City, Kan., recently announced a construction program for 1952 that will call for financing estimated to total 2 million dollars.

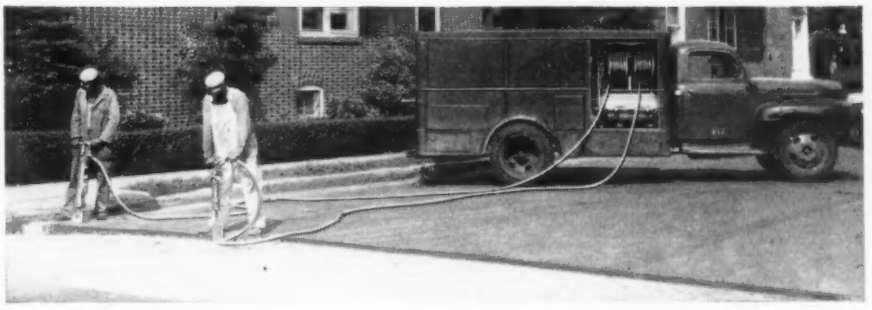
One million in common stock will be offered present stockholders on the basis of one new share for each 22 now held. The price will be fixed just below the market quotations when issued. The remainder of the funds will be raised by issuing first mortgage bonds and by bank loans as funds are needed for payment of new construction.

V V

New Kansas Cooperative Files for Incorporation

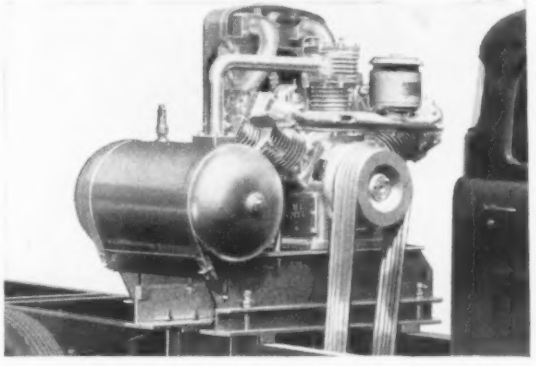
Directors of the newly formed S & T Telephone Cooperative, operating in an area which includes the towns of Kanorado, Goodland, Brewster and Colby, recently completed the legal steps necessary for incorporation and for REA

Costs $950 to $1000 less to buy and 50% less to maintain than trailer compressors



Jaeger truck-powered "Travel-Air"

Delivers 125 cfm at 100 psi—enough air to run 2 heavy breakers at full pressure—when truck engine is running at easy 1750 rpm. Simple power take-off is controlled in cab. Engine speed automatically regulated by air demand. 2-stage, air-cooled, force feed lubricated compressor unit.



Easily installed on Ford, Dodge, International, GMC, Chevrolet 1½ and 2 ton rated, long wheelbase trucks.

Sold, serviced by distributors in 130 cities. Send for Catalog TC-1.

THE JAEGER MACHINE COMPANY, 672 Dublin Avenue, Columbus 16, Ohio

Telephone men know

"YANKEE"

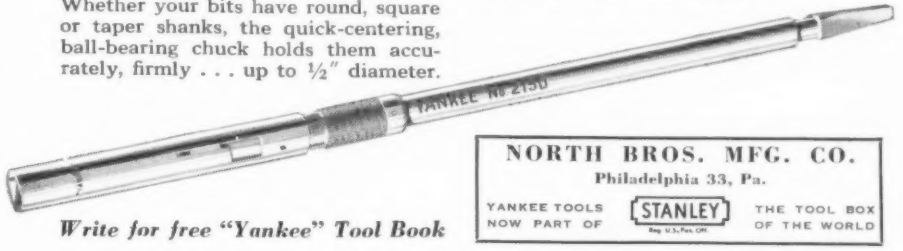
RATCHET BRACES and BIT EXTENSIONS

"Yankee" Ratchet Braces and Bit Extensions are old telephone company friends. Maintenance and installation men know from years of using them the sturdy stuff they're made of, the fine way they're made and how much these tools ease up a job.

The No. 2101 Brace was made with an installer time ticket in mind. It has the famous "Yankee" Ratchet that's easy, positive and quiet. The shifter will not move when you're drilling. Whether your bits have round, square or taper shanks, the quick-centering, ball-bearing chuck holds them accurately, firmly . . . up to ½" diameter.

You bore true and fast because the patented sweep handle cancels out excessive play or binding. Practically unbreakable hard rubber handles.

The No. 2150 Bit Extension holds square shanks firmly in an inner socket. Chuck is constructed to accommodate all types of square shanks securely and without jamming. Taper end of shank is accurately machined. Bit cannot loosen while extension is in use. Made to follow 11/16" bit or larger.



Write for free "Yankee" Tool Book

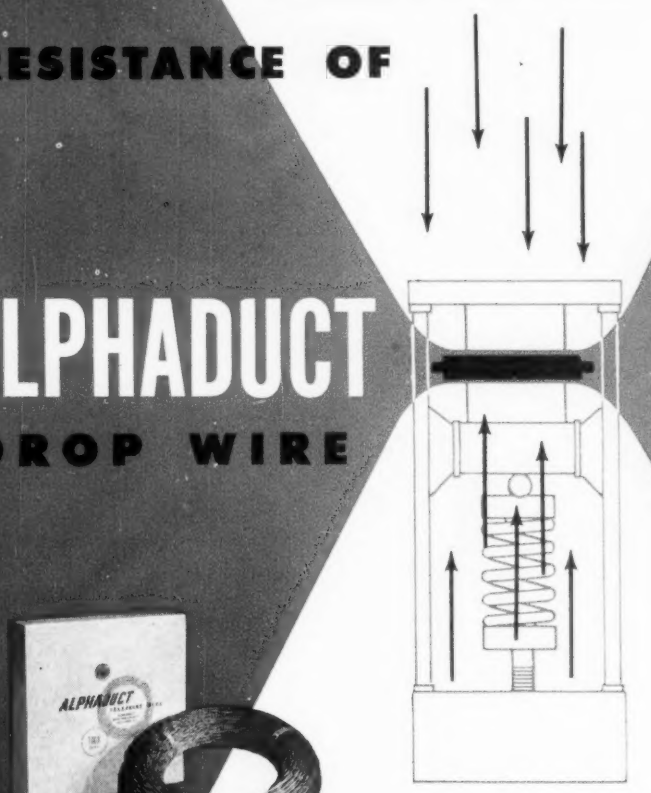
NORTH BROS. MFG. CO.
Philadelphia 33, Pa.
YANKEE TOOLS NOW PART OF STANLEY THE TOOL BOX OF THE WORLD

1500 pounds

MINIMUM COMPRESSION RESISTANCE OF

ALPHADUCT

DROP WIRE



Alphaduct drop wire is designed and built to be the longest lasting drop wire you've ever installed. It's tested . . . completely, thoroughly and often to make sure that every single coil is up to Alphaduct's rigid standards.

Here's how the insulation is tested to make sure it won't crush.

Short lengths of Alphaduct are placed between the steel plates of a compression testing machine. These plates are then forced together at uniform speed until the insulation crushes. Alphaduct parallel drop wire has to withstand a minimum load of 1500 pounds before it breaks. Each conductor of Alphaduct twisted pair will withstand a 1000 pound pressure.

You don't have to worry about a little rough handling breaking down this kind of tested insulation. Try Alphaduct drop wire. It's dated, so you can see for yourself the extra wear it provides.

ALPHADUCT WIRE AND CABLE COMPANY • MILLTOWN, NEW JERSEY

NATIONAL DISTRIBUTORS • LEICH SALES CORPORATION, CHICAGO, ILLINOIS

REGIONAL DISTRIBUTORS • PANKEY SUPPLY CO., CHARLOTTESVILLE, VA.

THE LINDSAY TELEPHONE SUPPLY CO., CLEVELAND, OHIO

(Rural Electrification Administration) assistance.

Directors include Harvey Shelton, G. M. Hines and Carl Denton, all of Kanorado; Wilmot Price and Harlan House, both of Goodland; Clifford Miller, Harry Eicher and Earl Dawes, all of Brewster, and Lloyd White and Roy A. Kistler, both of Colby.

V V

Two Nebraska Companies to Replace Two Farm Mutuals

Squaw Mound and Valley telephone companies have been organized to take over two farm mutuals that have been giving grounded line service in northwestern Nebraska. All the lines of both companies are being entirely rebuilt under the supervision of an engineer of Northwestern Bell Telephone Co.

On two of the lines, common battery service is provided by the Squaw Mound company. Farmers on the third line voted to retain magneto service. The lines which are connected with the Crawford exchange of Northwestern Bell are all metallic.

V V

Pennsylvania Company Sells $2 Million in Bonds

Pennsylvania Telephone Corp., the third largest subsidiary of General Telephone Corp., recently sold 2 million dollars principal amount of 3½ per cent first mortgage bonds, due 1981. The bonds were placed privately through banks with various pension funds and benefit organizations.

Proceeds from the sale of the bonds will be used for construction and to retire bank loans incurred in connection with construction.

During the first 10 months of this year the company made gross additions to plant exceeding $4,800,000. The company serves 136,000 telephones in Erie, Johnstown, Oil City and in surrounding communities.

V V

Six Graybar Executives Appointed to New Positions

Six executives of Graybar Electric Co., New York, N. Y., have been appointed to new posts in various districts.

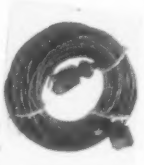
Effective Nov. 1, J. C. Tresnauk was appointed district operating manager at Richmond, Va., replacing J. U. Tatum who is on sick leave. He formerly was district supervisor of training at New York.

The appointment of C. J. Fiely as operating manager at Evansville, Ind., and H. C. McKenney to succeed him as

(Please turn to page 72)

Telectric Values UP TO NEW HEIGHTS

Wire Cable



Signal Corps 3E345.100

5 pair 19 ga. tinned copper rubber insulated, color coded Neoprene jacket ½" OD, equipped with molded hemorphodite plug each end to connect with same type plug on either end of another length.

Ideal for temporary service or as multiple drop cable, aerial or underground, in conduit or direct. 100 and 200 foot coils, new per ft. ..... 5¢

5 pair, same as above except with tough rubber jacket ½" OD. 1000' and 2640 foot reels, per ft. ..... 5¢

2 pair 19 ga. rubber insulated, lead, double steel tape armor, jute wrapped. 1000' factory reel, per ft. ..... 15¢

5 pair 19 ga. rubber insulated, lead, wire wrapped, jute overall, per ft. ..... 25¢

300 pair 19 ga. single paper ins. lead. New W.E., 1 200 ft. length, pressurized 1 115 ft. length cut & sealed, will be sold only in these specified lengths no charge reel, per foot $2.50

Braid Switchboard cable, 22 & 24 ga. enameled, assorted coils and sizes, most is new, all is good. Specify no. of pairs (first & second choice) and individual lengths desired. Per foot, per pair ..... 1¢

DROP WIRE—BRIDLE WIRE—500' & 1000' factory wrapped coils

#14 tinned solid HD copper or bronze, tw pr., wp braid	$28.50 M
#17 tinned solid HD copper or bronze, tw pr., wp braid	19.50 M
#18 tinned solid HD copper bridle wire, tw pr., wp braid	17.50 M
#18 tinned solid Copperweld, parallel, wp braid	17.50 M
#17 tinned solid Copperweld, twisted pair, wp braid	18.50 M
#17 tinned solid HD copper, parallel, plastic, 2500' reel	15.00 M
#22 tinned solid W.E.GN station wire, rubber ins. cotton braid, impregnated, twisted pair, 1000' coils, brown only	10.00 M
W-110 B Army field telephone wire, tw pr., rubber ins., wp braid (3 copper, 4 steel strand each conductor) app. 5000' per reel	$15.00 M

Note: Limited quantities of above items available—please indicate an alternate type acceptable. Sample on request.

TERMINALS

COOK 51 pr. uniflex TERMINAL **$10.00 LOTS OF 5**

Used inside or out wherever an unprotected terminal is indicated. Mounts either end up in pole or wall box, underground vault, main frame, etc.

Saves space as half of the studs are on each of the two sloping front panels.

SIZE, with bracket attached, 9" wide; 12½" high plus 4¼" nozzle; 7" deep.

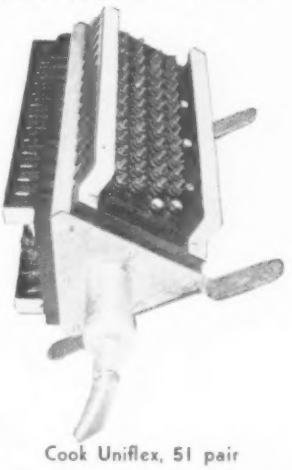
Complete with bracket and 10' No. 22 ga. 51 pair cable stub attached.

NEW: Factory packed crates of five terminals.

$10.00 each

less than five $12.50 each

Cook M16 unprotected 51 pair, with 6 ft. 19 ga. stub $15.00



Cook Uniflex, 51 pair

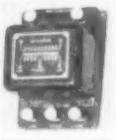
W.E. B 101, 101 pr. cross-connecting, consists of two B 101 pr. terminals with stubs, in wooden pole house, zinc-roofed, for pole or wall mounting. Size 13"x20½"x51½". Note: one 101 pr. terminal equipped with quickly removable fuse panel furnished with fuses. Designed for cross connecting aerial to underground, may be used for terminating or cross connecting up to its cable pair limit. $75.00 each

W.E. B 101, unprotected, with 19 ga. stub	$30.00
W.E. B 101, fused, with 19 ga. stub	40.00
B 101 pole house, less terminals	29.50
W.E. E 51 51 pr. unprotected. Same size as B 101 but studs are double spaced for carrier and special applications, with stub	27.50
W.E. B 26 unprotected, with stub	15.00

C-114 Loading Coil (Signal Corps)

Contains 1 W.E. 632 (88 millihenry) coil. Weatherproof case with hole-thru screw terminals 3"x3½"x4", light weight (may be suspended by pair it loads. Recommended for loading W 110 B Army field wire at one mile intervals. May be used at cross-connect terminals for loading cable pairs or may be melted out of case. $1.00

C-161 Repeating Coil (Signal Corps)



Ring-thru-talk-thru 2 windings, 57 ohms each, one center-tapped. Phantom or Simplex indoors or out. New $2.00 each, used, good $1.50

Climbing Equipment (Signal Corps)

New—A-1 Safety Strap, 70 inch adjustable, fabric webbing. Drop-forged safety hooks, riveted	$2.00
Body-Tool Belt—size 46" (28" between D rings) with plier and tool pockets, fabric webbing	2.00
Set consisting of one each above items	3.75
Climbers, Klein 1901 type, 16", w/straps	5.00
Lineman's Wrench, Bell System type (LC 25A)	1.00
Test Leads, for bare or ins. wire (CD 191)	1.00

Orders will be filled in turn after Jan. 1 (inventory time), unless in emergency. Do not delay your order as stocks are limited.

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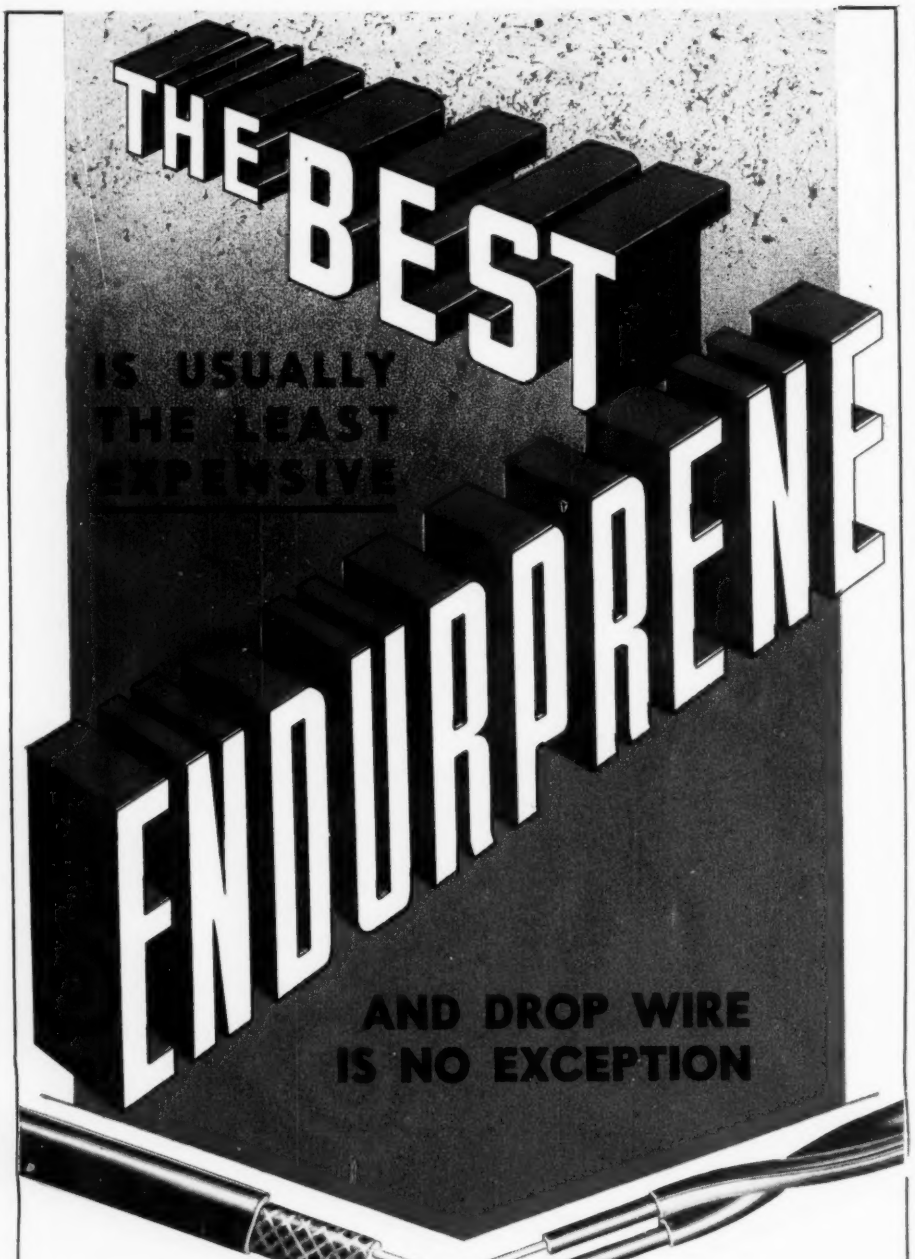

Rock-bottom maintenance costs—the aim of every on-the-ball plant executive—come when you buy the drop wire that stays up, year after year, storm after storm.

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operating manager at Dayton, O., also were effective on Nov. 1.

Effective immediately, W. V. Quigley is the new operating manager at Providence, R. I.

M. E. Lee is the newly appointed operating manager at Aberdeen, S. D., for the company.

W. T. Bronson, former manager, inside and outside lighting sales at Detroit, has been appointed manager of the Lansing, Mich., branch.

V V

Highway Company Promotes Hull to Sales Manager

Promotion of Ronald E. Hull to the position of sales manager of the utility division of Highway Trailer Co., Edgerton, Wis., recently was announced by L. E. Craig, vice president and director of sales.

In his new capacity, Hull will be responsible for the sale of Highway's complete line of public utility truck

R. E. HULL

bodies, pole trailers, cable reel trailers, earth boring machines, winches and power take-offs.

For the past eight years, Hull has been with the Highway company as utility service manager and utility sales engineer. Before joining Highway, he was with the General Motors Corp.

V V

G. L. Nord Appointed To Committee on Selenium

Gordon L. Nord, vice president and chief engineer, Schauer Manufacturing Corp., Cincinnati, O., has been appointed a member of the Selenium Rectifier Stack Manufacturers Advisory Committee. Nord will attend committee meetings in Washington, D. C., where problems of selenium shortages,

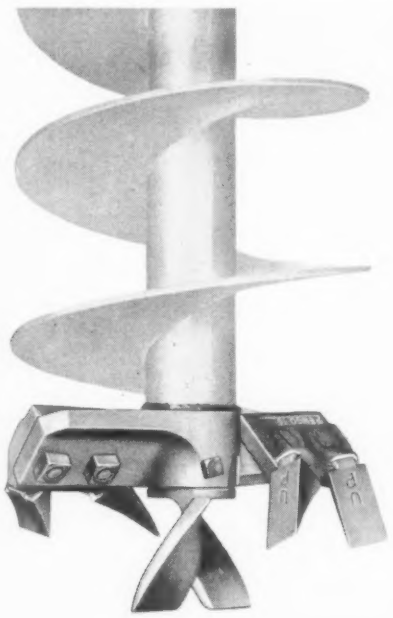
allocations and deliveries will be discussed.

Schauer Manufacturing Corp., is one of the manufacturers of rectifiers using selenium for direct current power supply instruments used by the telephone and telegraph industries in radio servicing and testing equipment and in automotive battery charging units.

V V

Peterson Company Announces New Earth Drill Cutting Head

A new cutting head for welding onto any continuous helix type earth drill or post hole auger is now in production by Petersen Engineering Co., Santa Clara, Cal., designated as the Pengo Cutting Head. (See Cut). The new



unit is of twin helix design. It replaces the conventional cutting head by means of direct welding to the bottom of any continuous helix auger. The Pengo cutting head is said by its manufacturer to work favorably under any kind of ground conditions, but its main features are that it makes it possible to bore holes under adverse conditions with machines using the continuous helix auger, where formerly only the heavier type machines were capable of boring.

The company says the cutting teeth are arranged in the same staggered pattern as provided on the manufacturer's regular heavy duty twin helix Pengo Earth Auger used widely by power and telephone companies. All Pengo cutting head parts are standard and are interchangeable with the standard Pengo earth auger of the same size, including the shank plates, replaceable points, and the fishtail pilot bits.

Pengo cutting heads are available in eight sizes ranging from 10 inches

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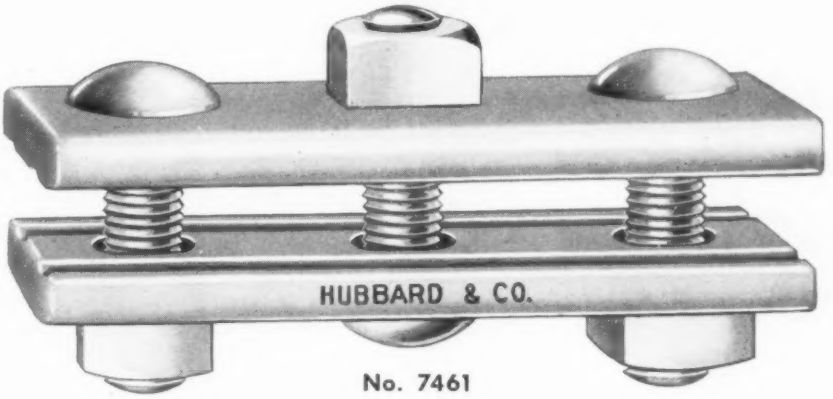
HUBBARD GUY CLAMPS

Hot Galvanized



No. 7461

The tremendous holding power of Hubbard Guy Clamps may be attributed to the straight, parallel grooves which grip the strand securely along the entire length of the clamp. Special strength steel bolts have large heads and oval necks which trap in the clamp body and prevent turning while tightening. Clamp Bolts will not strip nor elongate in normal use.

Manufactured in 1 to 4 bolt styles. For complete information, write or call the Hubbard and Company office nearest to you.

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Cable Suspension Material—Wireholders—Pole Seats and Balconies—Clevises—Braces—Drive Hooks—Messenger Dead Ends—Extension Arms—Long Span Material—Pins—Clamps—Guards—Stubbing Bands—Guy Protectors—Guy Clamps—Pole Struts—Clips—Straps—Hangers—Carriage Bolts—Rings—Transposition Brackets—Eye Bolts—Pole, Corner and House Brackets—Guy Hooks—Strain Plates—Storm Guy Straps—Lags—Machine and Hubeye Bolts—Sidewalk Guys—REA Telephone Hardware

UNDERGROUND

Cable Racks—Manhole Ladders and Steps—Pulling-in Irons—Expanding Anchors—Cable Shields—Screw Steelwing Anchors—Anchor Rods—Ground Rods and Clamps

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to 24 inches in diameter. Literature and prices may be obtained from the manufacturer.

V V

October Fire Losses Up 9.4% Over Year Ago

Estimated fire losses in the United States during October were $54,660,000, it was announced recently by Lewis A. Vincent, general manager of the National Board of Fire Underwriters.

This is an increase of 9.4 per cent over losses of $49,953,000 reported for October, 1950, and an increase of 2.4 per cent over losses of $53,398,000 reported for September, 1951.

Losses for the first 10 months of 1951 now total $603,135,000, an increase of 6.5 per cent over the first 10 months of 1950, which totaled $565,850,000.

These estimated losses under fire insurance policies include an allowance for uninsured and unreported losses.

V V

"We have embarked on a campaign to save the rest of the world from bankruptcy, social injustice and Communism, but we cannot hope to pursue it successfully, unless government generally is prepared to reduce its costs to the point that we can afford to make the extraordinary contributions the times demand of us." — Gouverneur (N. Y.) Tribune-Press

POLES

B. J. Carney & Co., 100 N. 7th St., Minneapolis, Minn.—Western red cedar poles. Pentrex Butt Treated or Plain.

Cascade Pole Co., P.O. Box 743, Tacoma, Wash. — Creosoted Douglas Fir and Cedar Poles.

C. M. Christiansen Co., Phelps, Wis.—Northern White Cedar Poles, plain or butt treated.

Dierks Lumber & Coal Company, Creosoting Division, 700 Dierks Bldg., Kansas City, Mo. — Pressure creosoted yellow pine poles at our modern plant at Process City, Ark., near DeQueen.

Eppinger & Russell Co., 80—8th Avenue, New York 11, N. Y.—Creosoted Poles and Cross Arms. Plants: Jacksonville, Fla., Norfolk, Va., Eddington, Pa.

International Creosoting and Construction Co., Galveston, Texas.—Creosoted Southern Yellow Pine Poles. Plants Beaumont and Texarkana, Texas.

Montana Pole & Treating Plant, Butte, Montana — Fir Lodgepole Pine Poles. Butt-treated or Full-length treated with Creosote or Penta.

T. M. Partridge Lumber Co., Minneapolis, Minn.—Northern White—Western Red Cedar Poles, Plain or butt-treated.

Model 10EL
10,000 watts

with ONAN *Emergency* ELECTRIC PLANTS

Don't let power failures cripple service to your subscribers. A low-cost dependable Onan Standby Plant, installed in the exchange, assures normal operation at all times. Designed specifically for emergency service, Onan Electric Plants with line transfer controls, start automatically when power fails, stop by themselves when regular power is restored.

Onan plants are available in a wide range of sizes. 1,000 to 35,000 watts in standard voltages, cycles and phases. *Free engineering service on request.*

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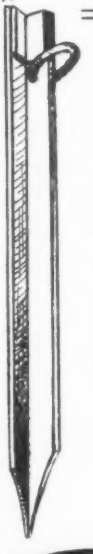

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